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LAKE WACCAMAW STATE PARK

columbus county, north carolina

Foreword

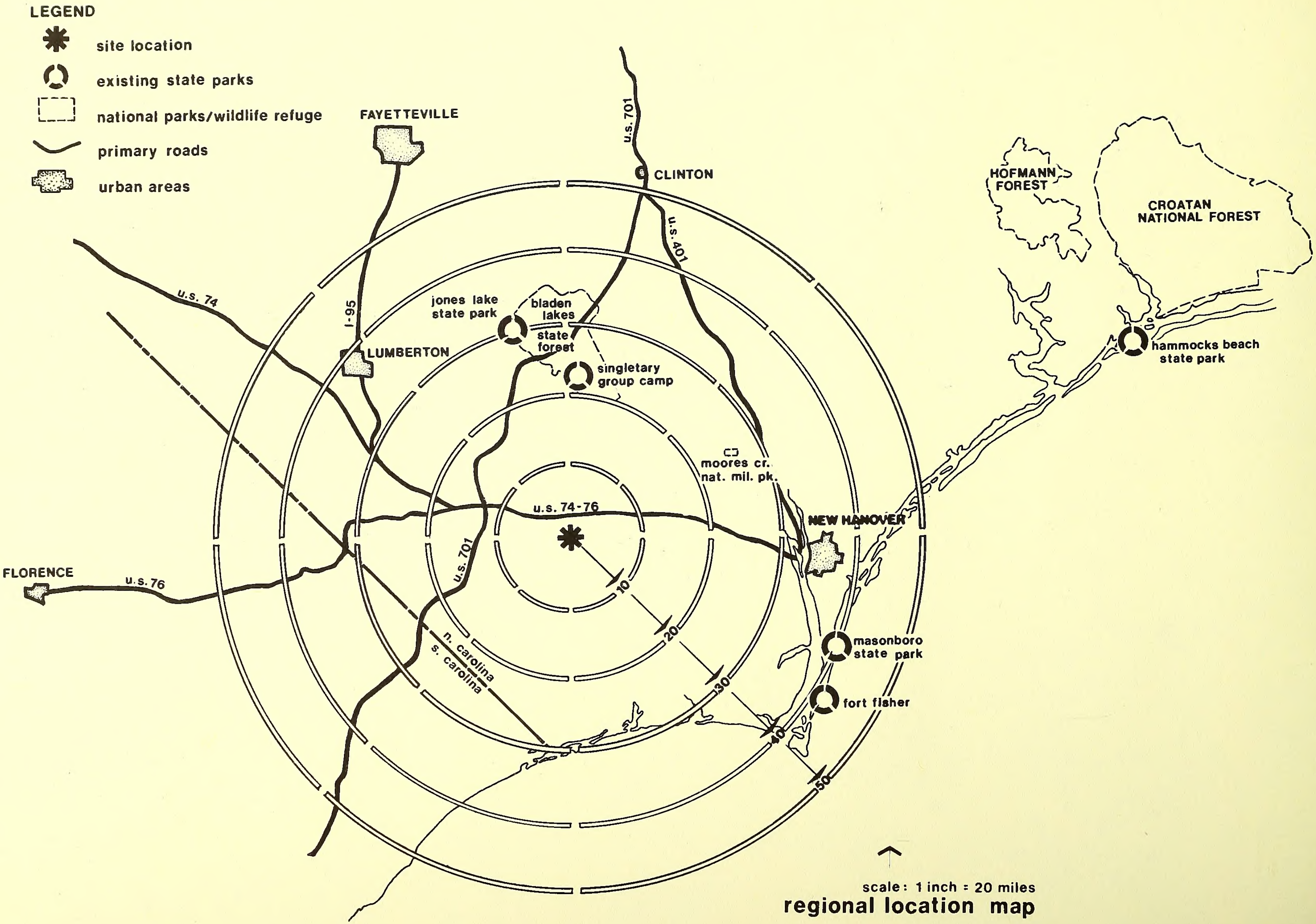
Since 1925, a concerted effort on the part of many individuals, officials of the Town of Lake Waccamaw, local representatives, and state officials has been made to make the 9,000-acre Lake Waccamaw permanently accessible to the citizens of North Carolina. In May, 1976, the first tract of land — 273 acres — was acquired for the Lake Waccamaw State Park.

This master plan documents and brings closer to reality the dream so many have had for over fifty years. Its purpose is to set forth a plan and program for the park's development. Planning has been aimed at achieving a balance of recreational and natural elements considering an optimum carrying capacity and the need for park protection. The plan is designed for implementation in phases which allows for both uninterrupted park use and continual reevaluation of the plan. The timing of development is contingent upon the availability of funds and the establishment of biennial statewide priorities.

This master plan study has been developed in depth and reflects the high priority given to it as part of the planning program. In keeping with the basis of this plan, decisions which affect the welfare of Lake Waccamaw State Park must reflect the principles and spirit of the State Park system.

LAKE WACCAMAW STATE PARK MASTER PLAN

MASTER PLANNING UNIT
DIVISION OF PARKS AND RECREATION
DEPARTMENT OF NATURAL & ECONOMIC RESOURCES
JULY, 1976



scale: 1 inch = 20 miles

regional location map

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CULTURAL RESOURCES

Location, Access, and Population

Located in the extreme southeastern coastal plain, Lake Waccamaw lies in Columbus County between Wilmington, in New Hanover County, and Whiteville, the Columbus County seat. Local governmental jurisdictions having a direct interest in the lake include the Town of Lake Waccamaw, Columbus County, and the Region O Council of Governments.

The lake area is accessible by U.S. Highway 74-76, the major east-west collector road linking Wilmington to western parts of the state. The highway passes through the Town of Lake Waccamaw, at which point it carries about 4,100 cars per day. Wilmington lies about thirty-five miles east of the lake. To the northwest, Charlotte is about one hundred and twenty miles away, Raleigh about ninety miles, Fayetteville about sixty miles, and Lumberton lies about forty miles away. The South Carolina State line is only twenty-five miles from Lake Waccamaw with Florence located about eighty-five miles due west of the lake.

Within a fifty-mile radius of Lake Waccamaw, the total population is estimated to be about 433,000 or 8.21% of the State's people. Both New Hanover County and Cumberland County, which contain the cities of Wilmington and Fayetteville, respectively, are each responsible for more than twenty-one percent of the area's population. Related South Carolina counties — Horry, Marian, and Dillon — account for about six-and-a-half percent of the population.

A comparison of the population base of the Lake Waccamaw State Park region to the other State Parks, randomly, is as follows:

	Population	% State
Lake Waccamaw	443,108	8.21
Crowder's Mountain	1,122,170	21.28
Eno River	966,830	18.33
Goose Creek	393,629	7.46
William B. Umstead	900,000	17.06

Between 1950 and 1970, all of the North Carolina counties within the fifty-mile study area, with the exception of New Hanover and Cumberland, have been characterized by high out-migration rates and high rates of natural increase. The result has been either a net loss or stability in population. Beginning about 1970, a general reversal in the migration trend occurred so that, over the past six years, in-migration has been on the increase. Additionally, the rate of natural increase has decreased in all related counties.

The population analysis by race and sex indicate that white males make up 31.66% of the regional population as compared to 37.04% statewide. White females compose 32.53% regionally compared to the State's 38.60% statewide. Black males make up 17.33% compared to the State's 11.73% and black females compose 18.48% of the regional population as compared to 12.63% statewide.

Based on population trends between 1970 and 1973 for the region and projections for the state by the Bureau of the Census, it is estimated that the population of the study area will increase 16.35% by 1980 and 30.73% by 1986. Given these figures, it can be estimated that by 1986 the region's population will increase to approximately 564,500.

History

The State of North Carolina first laid direct claim to Lake Waccamaw as public property during the 1827-28 legislative session. "An Act concerning the entry of lands now covered by the waters of any of the lakes of this State" prohibited taking possession of any land which was at that time covered by the waters of a lake. Rather, takers were required to reimburse the State. Any monies collected were, in turn, to be utilized for the "Literary Fund" which had been established by the previous Legislature for the establishment of common schools.

In 1911, the General Assembly dedicated Lake Waccamaw, among others, to permanent State ownership, to "always be and remain the property of the State of North Carolina for the use and benefit of all the people of the State." In 1929, the Legislature provided that all the State Lakes "be administered as provided for other recreational areas".

Before the white man's arrival, Lake Waccamaw was inhabited by the Waccamaw Indians, one of five tribes along the Cape Fear River. In fact, the old Lake road was at one time an Indian trail from the Outer Banks to Lake Waccamaw. The life of the Indian was much the same as the life of the early white settlers. They fished, hunted, lived off the land and cared for their own. Later, when turpentine and saw milling came in, they took advantage of that market.

The great Indian Chieftain, Osceola, was supposedly born on the shores of Lake Waccamaw, later to lead the Florida Seminoles in their war against the U.S. Government in the early 1800's. Numerous artifacts and remainders of Indian cultures have since been recovered. Jones Ridge, on the east shore of the Lake, is still sometimes referred to as the "Indian Mounds".

The park site itself, including proposed acquisition, includes the "Indian Mounds", as well as the entire south side of the Lake to the west bank of the Waccamaw River. A part of the Green Swamp, this specific area has had a lengthy history of close ties with wood products industries and associated logging operations.

In 1797 the State of North Carolina made grants to Stephen Williams for 100,000 acres of land, to William Collins for 40,120 acres and to Benjamin Rowell for 30,000 acres on the east side of Lake Waccamaw. These grants all joined each other and are basically the land which was purchased by the Waccamaw Land and Lumber Company in 1904.

The company's headquarters was located in Bolton where it operated a huge Double Band Sawmill. Logs from the lands purchased in 1904 supplied the mill. Later, these lands were owned by Riegel Woodlands Division, now known as the Federal Paper Company.

In early 1869, Charles Oscar Beers began a "shingle industry" along the southern shore of Lake Waccamaw. "Another shingle operation was begun south of the lake by Henry Bascom Short, just after Beers started his company. These two eventually merged their operations in 1879 with a work crew of over 400." Eventually, the two merged companies diverged from the production of shingles to become the North Carolina Lumber Company.

At the turn of the century, cypress shingles were being shipped across the lake from its south side on flat boats. They were then unloaded onto a pier to await transport by mule-drawn rail car to the Lake Waccamaw depot for shipment by freight train.

In later years, logging operations were rail-based. A rail spur followed the west side of the Lake, crossing the Waccamaw River just below the river "mouth". Remnants of the bridge crossing can still be seen. Today, most of this property is owned and managed by the Georgia-Pacific Corporation.

Efforts to establish a State Park on State-owned Lake Waccamaw began as early as 1925. "The June twenty-fifth, 1925 issue of the News Reporter featured an article, 'First Steps are Taken to Make Lake State Park'. Besides documenting efforts underway to secure land for a park and relating the many reasons the State should own at least some land on a 9,000-acre Lake it administers, the article tells of a huge heronry at the Lake where there are a great number of nests of the white heron, then an endangered species."

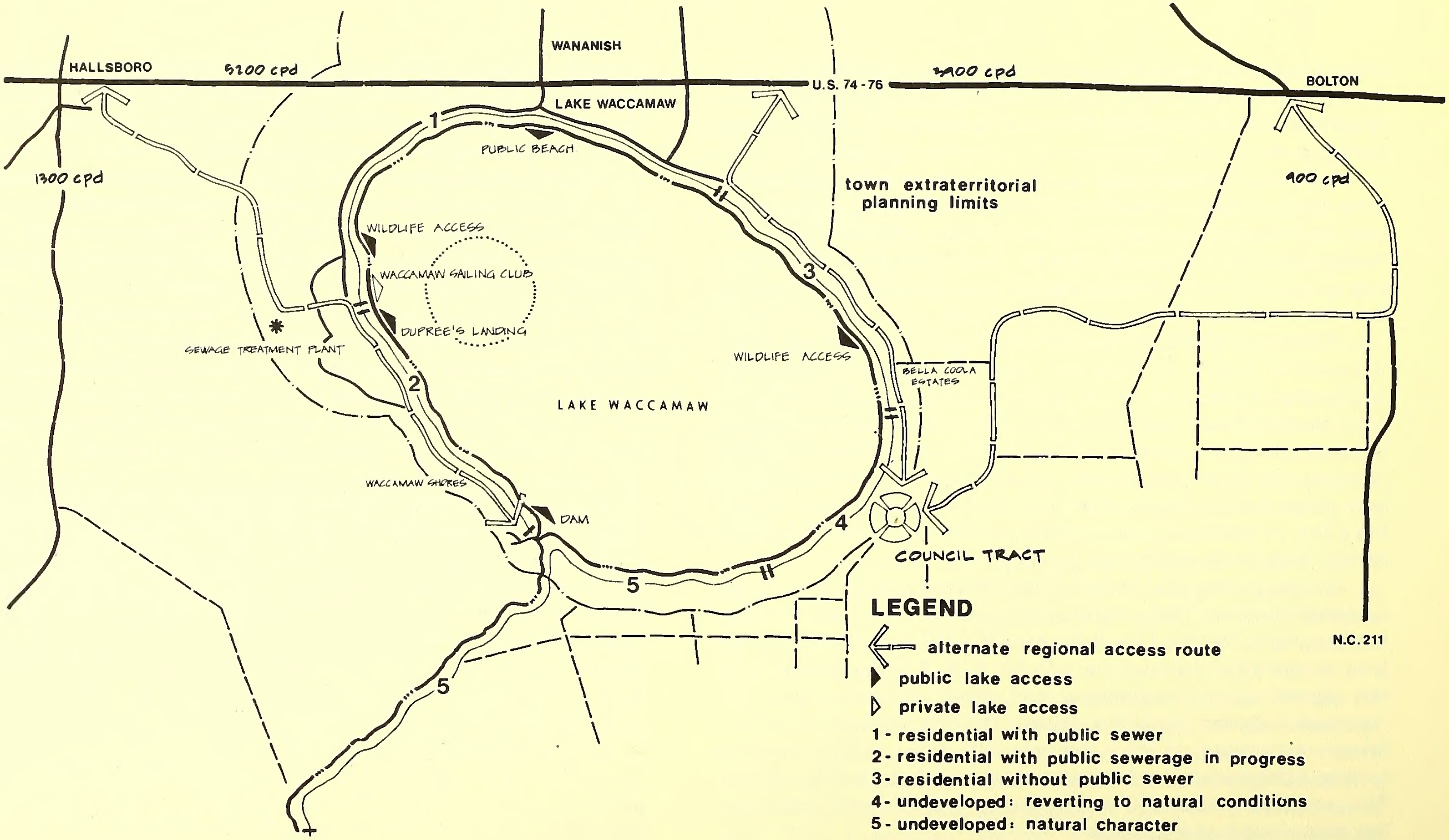
In May, 1934, Mr. J. S. Holmes, State Forester, proposed establishment of a State Park at "Waccamaw Lake" in a letter to Mr. Conrad L. Wirth of the National Park Service. The proposal took shape after discussions with Mr. L. A. Sharpe as well as a Mr. Stone about Waccamaw and other potential sites for "recreation parks." Later that month, the U.S. Department of Interior responded to Mr. Holme's letter by recommending further consideration of "Waccamaw Lake" as a State Park. The proposal involved "Forestry Camp # 52-P" which was being abandoned at that time.

Over the years, occasional letters from private citizens filtered into Raleigh encouraging development of a park. Finally, in October of 1964, the Board of Conservation and Development requested that a "concentrated effort to obtain land for a base of operation at Lake Waccamaw be made." About a quarter-acre of land was offered for sale at less than appraised value, but funding could not be obtained.

The Town Board of Lake Waccamaw unanimously adopted a resolution to consider establishment of a State Park on the south shore of the Lake in 1968. The following year, initial acquisition proceedings to establish the park were begun with a $50,000 appropriation by the General Assembly.

A 1969 land development plan for Lake Waccamaw by the N. C. Division of Community Planning included a park proposal. Two years later, the Cape Fear Council of Governments declared that the Lake Waccamaw State Park project "is not in conflict with regional plans and programs and is in keeping with regional objectives. We recommend favorable consideration of this project by B.O.R. [U.S. Bureau of Outdoor Recreation]." Finally, in May 1976, an initial 273-acre tract known as "Council Ridge" was purchased by the N. C. Division of Parks and Recreation to establish the park.

A planning study for Lake Waccamaw State Park was initiated in March of 1976 with the collection of resource data. A public meeting was held on April 8 during which interested citizens were invited to make suggestions as to what types of activities and facilities should be included in the proposed park. On June 10, citizens were given the opportunity to review three possible alternative plans and again were asked to make comments and suggestions. An amalgamation of the most desired aspects of the three alternatives was then accomplished in the form of a "Preliminary Master Plan," which was presented to the public at the July 4, 1976 Columbus County Bicentennial Celebration.



adjacent land use and development context

LAKE WACCAMAW STATE PARK

columbus county, north carolina

Adjacent Land Use and Development Context

The landscape of the region is characterized by long, straight roads dotted with dwellings or farm outbuildings overlaying an essentially flat plain. Communities are located at the intersection of primary roads and recognizable by the existence of a church and country store. Agriculture, widespread and the mainstay of most residents, is nevertheless marginal due to the poor soil conditions. Certainly the most pervasive and singly important industry in the region is the commercial forestry conducted by large timber companies. Covering a vast land area, it is not uncommon to drive for several miles past a continuous plantation of loblolly pine. The land holdings of timber companies include large areas of swampland, most of which has undergone varying degrees of reclamation and management for forest production. As a result, very little of the swampland has not been disturbed at some point in history.

Access to the Lake Waccamaw area is gained from two primary roads — U.S. 29-74, a heavily used road connecting Wilmington and Charlotte, and N.C. 211 which begins at Southport and runs northwest to Lumberton. U.S. 29-74 and N.C. 211 intersect at Bolton several miles east of Lake Waccamaw. Approximately 900 cars per day use N.C. 211 south of Bolton. Between Bolton and Lake Waccamaw, an average of 3900 cars per day use U.S. 29-74, west of Lake Waccamaw usage increases to about 5200 cars per day. With respect to the State Park — Council tract location, a plan for regional access may involve two alternative routes or a combination of routes. In determining appropriate access routes, three main objectives are apparent:

1. To deliver traffic to the site efficiently from a major thoroughfare with a minimum of stopping, and changing of direction — uninterrupted flow.
2. To reduce or eliminate potential traffic hazards that may result from a substantial increase in park destination traffic along existing public roads and to reduce nuisance to residents along an access road which is to be used for park traffic.
3. To reduce to a minimum new road development and the need for purchasing right-of-way through private property.

In delivering park traffic from U.S. 29-74, there are two existing means of access, both of which have particular limitations and benefits.

Alternative A:

From U.S. 29-74, south on N.C. 211 at Bolton, west on Main Canal Road/P & H Road, west on Big Ridge Road to the site. Total distance: 8.25 miles.

Alternative B:

From U.S. 29-74, south on N.C. 214, east on S.R. 1947 to its end, south on abandoned private road to the site. Total distance: 4.73 miles.

The advantage of Alternative A over Alternative B is the lack of existing domestic uses and related traffic along its route. The disadvantages of Alternative A are its increased length and, more important, the fact that from N.C. 211 the route would involve an access agreement with the Federal Paper Company and improvement of the road system. Additionally, a new short section of road would be required to connect N.C. 211 and the Main Canal Road.

Also of concern to a study of access is the possibility of the area immediately west of the lake dam — which is presently utilized as an ad-hoc public access point, though privately owned, coming into State ownership and being managed for public lake access in the future. Access to the dam currently involves use of the lake's perimeter road system. If, however, access were encouraged to this site as part of a park and/or scenic river plan traffic should be diverted at Hallsboro at S.R. 1001 in order that the impact of traffic on the older residential district on the east side of the lake would be minimized. After turning on S.R. 1001, vehicles would be directed east on S.R. 1736, and south on S.R. 1901 to the lake perimeter road.

Lake Waccamaw, due to its close proximity to the coast and relative isolation, has undergone relatively little development — especially in comparison with White Lake. About one quarter of the lake edge is undeveloped with the remaining land being developed or undergoing development for residential use. The Town of Lake Waccamaw, historically an advocate of the State Park, has been active within the recent past to administer policies for development particularly cognizant of the welfare of the lake as a natural and scenic resource. In order to insure against future encroachments and resource degradation, the town and county will need to implement further programs of protection.

On the northern edge, older, established dwellings and institutional uses of the town including the Boys Home and church affiliated uses, lie on high ground overlooking the lake. Within the past ten years, considerable development to the east and west of the town center has occurred. Lake Cove is the oldest subdivision on the lake being built on reclaimed swampland. Lots are only of single depth from the lake with the perimeter road located between the dwellings and a canal which was created for the subdivision.

More recent residential development along the lake front includes Bella Coola Estates and Shawnee Acres to the east of the town. Partial development of the Bella Coola land has occurred with an additional two hundred acres of land lying between the currently developed property and the State Park — Council tract, presumably to be developed in the near future. Shawnee Acres is a new subdivision having larger lot sizes than the Bella Coola property and located between the town limits and Bella Coola Estates. Most of its lake shore property has been developed for residences. Building involving the reclamation of swampland is presently occurring on the opposite side of the perimeter road.

On the opposite side of the lake, south of the Lake Cove area is a large, new subdivision called Waccamaw Shores which extends nearly to the dam. At present, primarily lakeshore is developed although substantial swampland is undergoing reclamation. Unlike the other areas of the lake, Waccamaw Shores consists of a variety of dwelling types from large single-family houses to mobile homes.

Of particular importance to the park is the availability of public sewer service and, with respect to the increasing development around the lake, the lack of it. In relation to the lake edge, public sewer has been extended and serves all units within town limits, approximately from the Waccamaw Sailing Club to the eastern extension of N.C. 214. Sewer service is presently being extended through the Waccamaw Shores development. It is within this area, due to the availability of public services and vacant land, where increased pressure for development will be greatest. East of the town, residential units are served by either septic tanks or privies and, due to the soil conditions and high water table, are a source of pollution.

Access to the lake is available to all lakefront residents, most of which have piers extending into the water. The general public may choose between five lake access points. In addition to the dam, two N.C. Wildlife Division Access Areas exist and a public beach maintained by the town are located on the lake. Additionally, Dupree's Landing is a commercial facility available to the public. The public beach has very little available parking and no boat launch. The two wildlife areas can serve up to about twenty to twenty-five cars at a time.

The Waccamaw Sailing Club, a private membership facility, is located on the west side of the lake between the wildlife area and Dupree's Landing. The club has received a permit to establish and maintain an Olympic-size sailing course, one mile in diameter.

The extra-territorial planning jurisdiction of Lake Waccamaw extends one-mile from the town limit and, by special legislation two thousand feet around the entire circumference of the lake. The undeveloped land extending from Bella Coola Estates to the lake dam is currently zoned "Agricultural/Forestry". This district provides for a number of low-intensity uses including agricultural, forestry, single-family residential, and parkland. Additionally, the district includes a provision for "conditional uses" — uses which are permissible but require approval of the City Council and may involve particular restrictions on design and appearance. These uses include mobile homes, golf courses, and public buildings such as fire stations. This zone is the catch-all district for all areas having less than moderate development.

With respect to general policies relating to the overall welfare of the lake and protection of State Park land, it is recommended that the town incorporate the following points into a development plan and program:

1. Extension of public sewer to service the eastern lakeshore.
2. Development and adoption of restrictive zoning along presently vacant land for the purpose of preserving open and scenic shoreline.
3. Development policies intended to reduce siltation and pollution of domestic water supplies and provide protection of scenic lands, in general, and specifically aimed at existing mature swampland.

Regional Recreation Supply

With the exception of the coastal beaches and White Lake resort area, southeastern North Carolina is very deficient in most all forms of recreation facilities and opportunities. Fishing and boating are the only major exceptions. Virtually every county has a number of ponds and lakes which are open to the public (usually for a nominal fee). In addition, the Wildlife Resources Commission operates 20 Wildlife Access boat launching sites in the nine-county study area. Two of these boat access areas provide access to Lake Waccamaw. Another informal boat launch provides access to the river just below the dam.

Camping is located almost exclusively along the coast and at White Lake. Two hundred twelve commercial campsites are located along the coast, with 78 additional sites at Carolina Beach State Park. The vast majority of the remaining campsites in the region are located at White Lake in Bladen County. All are commercial with the exception of the 18 sites at nearby Jones Lake State Park. A fish camp on Lake Waccamaw provides the only campsites in Columbus County, but these 32 sites are not family camping oriented.

Swimming and bathing are concentrated in the same areas. Most other areas in the study region have no such facilities. Although five communities in Columbus County do have swimming pools. While the public is currently permitted to utilize a section of beach on Lake Waccamaw, owned by the Boy's Home, no publicly owned beach is available on the lake. Furthermore, parking at the Boys Home beach is very limited.

Picnicking is essentially offered only at Jones Lake (Bladen County) and Carolina Beach State Parks, Fort Fisher State Historic Site and Recreation Area (New Hanover County); and Moore's Creek National Military Park (Pender County). However, a few municipal parks offer some picnic facilities.

With a total of 89,102 acres of North Carolina Wildlife Resources Gamelands within a fifty-mile radius, hunters are provided ample opportunities in the area. In any case, hunting is normally not permitted in State Parks.

Virtually no other recreation opportunities are offered in the nine-county study area. However, a number of opportunities and facilities which are presently not available in the area would be appropriate in a state park.

Recreation Demand

Demand for outdoor recreation activity is increasing steadily, both in the nation and in North Carolina. Such demand is directly proportional to three primary factors: population, income, and leisure time. All three factors currently show positive trends. Statewide, the human population is increasingly 1.2% annually. This means an increase of approximately 795,058 people by 1986. However, in the 50-mile radius study area, the weighted average population growth is twice the statewide rate, or 2.4% annually. Meanwhile, incomes and leisure time are increasing at the annual rates of 0.25% and 0.5% respectively. Thus, demand for outdoor recreation in North Carolina is expected to continue its upward trend.

Attitudes concerning the adequacy of outdoor recreation facilities and the desires for outdoor recreation opportunities are varied. The age groups for which existing facilities are felt to be the least satisfactory are, in descending order of magnitude, ages 13 to 19, 65 and older, and ages one to 12. Less than 19% of all North Carolinians feel that outdoor recreation opportunities for any age group are "very satisfactory."

Most people feel that if facilities were closer to them, allowing easier access, their participation in outdoor recreation would increase significantly. In response to the question "what one change would most affect your outdoor recreation participation?", 37.1% indicated closer facilities with easier access. Other responses and the percent responding were: 1) more leisure time — 28.6%, 2) higher income — 23.1% and 3) improved facilities — 6.8%. A small number — 4.5% of those responding — feel that nothing would change their rate of participation.

Adding to North Carolina's recreation needs are out-of-state visitors. One-third of these out-of-state visitors originate from the northeast and north central regions. Another one-third comes from our four bordering states. In 1975, 5.37 million persons from beyond our state borders engaged in outdoor recreation activities in North Carolina. Of this number 1¼ million were campers of one sort or another. However, the projected outdoor recreation participation rate in terms of visitor-days is 59% for in-state residents versus only 41% for out-of-state visitors.

State Parks and Recreation Areas, of course, bear a substantial portion of this burden for meeting our citizens' needs for outdoor recreation opportunities. However, in comparing existing North Carolina State Park acreage with the standard of 20 acres/1000 population (half the national average) a deficit of 31,400 acres still exists despite the tremendous progress achieved toward reaching this goal in recent years. The nine-county study area currently has less than half this standard with only 9.7 acres/1000 population. Considering only the four-county planning region in which Lake Waccamaw lies (Region 0), there exist only 2.7 State Park acres per 1,000 persons. These figures accentuate the desirability and need for establishing a State Park at Lake Waccamaw.

Of the thirty-four most prevalent outdoor recreation activities in North Carolina, sixteen were considered as having at least some possibilities for a state park at Waccamaw. Foremost among these are picnicking, swimming and camping, ranked third, sixth and fourteenth, respectively, in terms of statewide activity days.

Picnicking is regarded as having medium potential for development in the region, according to SCS appraisals which considered natural resources, people of the region, and the facilities necessary for development. This particular activity is the most popular in North Carolina State Parks. In addition, picnicking lends itself well to a number of day-use activities with which it can be associated. Family, as well as group picknicking with reservations should be considered.

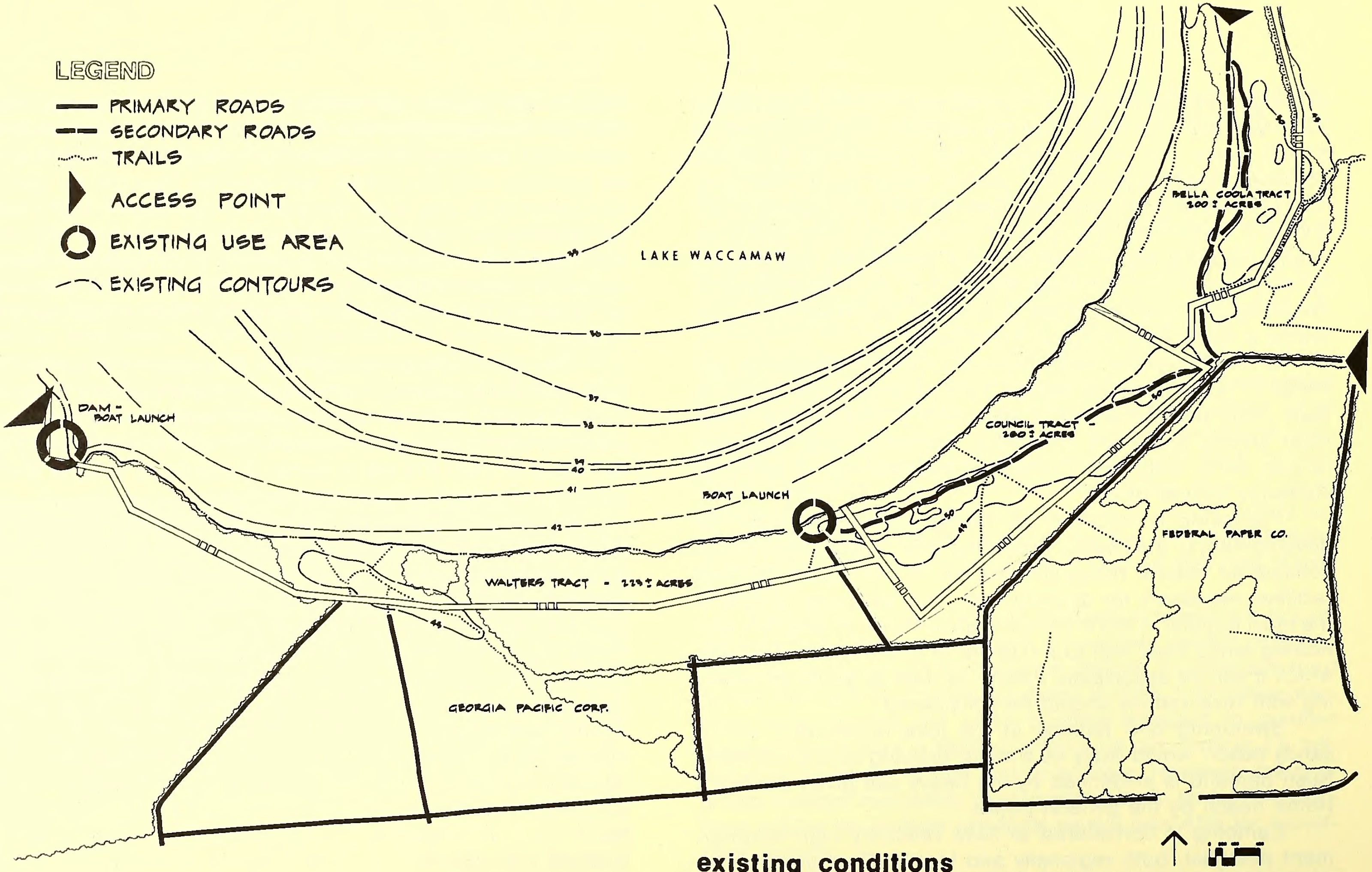
Swimming and bathing in the lake, associated with a sandy beach, would likely be a major drawing card to the park. Such demand is evidenced by the heavy use given the Boy's Home beach by the general public.

Camping is considered to have relatively high development potential, both regionally and locally. Over the last five years, this activity has increased 35% in North Carolina State Parks. Vacation family tent and trailer camping ranks at the top as far as potential, while transient camping is of much lesser importance. Boat-in (or canoe) camping offers possibilities both on the lake shore and along the river, as does walk-in wilderness camping. These latter two types of camping should be provided both for groups and families. Demand for group tent camping is also quite apparent. Group cabins might also be considered, but family cabins should probably be discouraged because of the close proximity of competing privately owned vacation cottages surrounding the lake. The potential for developing such cabins, however, is medium-high for the region.

Fishing is ranked number nine statewide in terms of activity days. Its popularity has increased more than any other N. C. park activity over the last five years, over 90%. Locally, it is probably the most popular recreational activity and is likely to remain at or near the top in terms of popularity at Lake Waccamaw, regardless of park development.

The biggest effect the park is likely to have regarding fishing is providing better boat access. The two existing Wildlife boat access areas are woefully inadequate in meeting current demand. Parking is particularly critical.

The Wildlife access boat launches also provide for recreational power boats (ranked 15th in popularity statewide), and water skiing (ranked 16th). Some sailboats are also launched, particularly at the access area on the west side of the lake. Sailing (ranked 33rd) is obviously popular in the region as is evidenced by the number of sailing craft in the area, and the existence of the Lake Waccamaw Sailing Club. Canoeing (ranked 27th) is popular on the Waccamaw River, although small fishing boats also traverse the river. Boating, in general, has increased over 28% in N. C. State Parks over the last five years. Thus, boating of the various types mentioned, and associated activities and facilities, offer considerable potential for Lake Waccamaw State Park.



existing conditions

LAKE WACCAMAW STATE PARK

columbus county, north carolina

Nature walking (ranked 7th) and hiking (ranked 30th) offer substantial potential at Waccamaw, particularly along the lakeshore and river. A broad array of trails from backpacking trails to interpretive trails for the blind should be considered.

Associated with both nature and canoe trails are bird watching (ranked 10th) and Wildlife Photography (ranked 28th). Wildlife abounds in the Lake Waccamaw and River areas.

Bicycling might be considered, particularly if park bike trails can be tied to the community of Lake Waccamaw. Bicycling on the scenic lakeshore road is a popular local activity which could be enhanced by the park as a destination. Visitors to the park could, in turn, enjoy the same opportunities from the park.

Most of the above mentioned recreational activities can be associated with sightseeing, the second most popular recreational activity in North Carolina. Closely related to sightseeing is pleasure driving, the single most popular statewide activity. A scenic lakeshore entrance drive into the park could greatly enhance both of these activities.

Existing Site Conditions

The present status of land along the edge of the lake from the Bella Coola property to the dam has been greatly influenced by the timber companies, whose land surrounds the site. Not only have the natural resources undergone significant changes, but equally important with respect to park planning, a road system has been established which provides for high penetration to the site. No fewer than seven primary roads maintained by the timber companies enter the site at different points. In addition, access to the site is available along secondary roads through the undeveloped Bella Coola property. Consisting mainly of abandoned roads, a fairly extensive array of trails exists in conjunction with the road system.

Despite this abundance of access, use of the property by the public is limited to two sites primarily due to the extensive bog and shrub thicket inhibiting pedestrian movement. Immediately west of the Council tract, one of the few locations where an upland situation adjoins the lake, fishermen may park their cars near the water's edge and launch their boats. Apparently, this area is not heavily used because of its relative isolation and, more importantly, due to the shallowness of the water.

Within the study area, public access to the lake is heaviest at the lake dam. An open, informal parking area has been established — and used by the public for some time — at the end of the lake's western perimeter road. The area is less than a quarter-acre in size with enough parking space for fifteen to twenty cars. Due to the fact that the area is not managed for public use and has no facilities, trash and sewage disposal is somewhat of a problem. It is, nevertheless, an important access point inasmuch as it not only serves the lake but also the river, at its origin. Fishing is very good both above and below the dam. Additionally, the parking area is directly opposite the mature swamp forest, east of the dam.

Land in the study area is divided among five owners. The 280-acre Council tract, which has about one mile of shoreline, is adjoined to the east by the 200 acres of undeveloped Bella Coola property. To the west of the Council tract, the remaining shoreline property around to and including the dam access area is owned by Dr. H. G. Walters. This tract totals about 223 acres. Behind these lakefront properties, land ownership is divided between the Georgia Pacific Corporation and the Federal Paper Company along the Western Boundary Road.

No buildings or other structures are located in the area, nor is there any evidence of recent domestic use. Archaeological investigations have produced numerous artifacts from the site. However, none are considered to be of major significance.

NATURAL RESOURCES

Climate

Climatic conditions of the Lake Waccamaw region are characterized by long, hot, humid summers and short, chilly, humid winters. The area is within the region of highest average annual temperature (64°F) and highest average January temperature (48°F) for the State. There are an average of 230 freeze free days — March 26 being the latest freeze date (32°F) or below) and November 8, the earliest.

The region receives between forty-six and fifty inches of precipitation annually with a moderate potential for damaging tropical storms. Freezing rain or sleet can be expected very seldom — once or twice a year. The evapotranspiration rate is approximately 33.66 inches annually with a potential ground and surface water reserve equal to ten inches per year in run-off.

Geomorphology and Geology

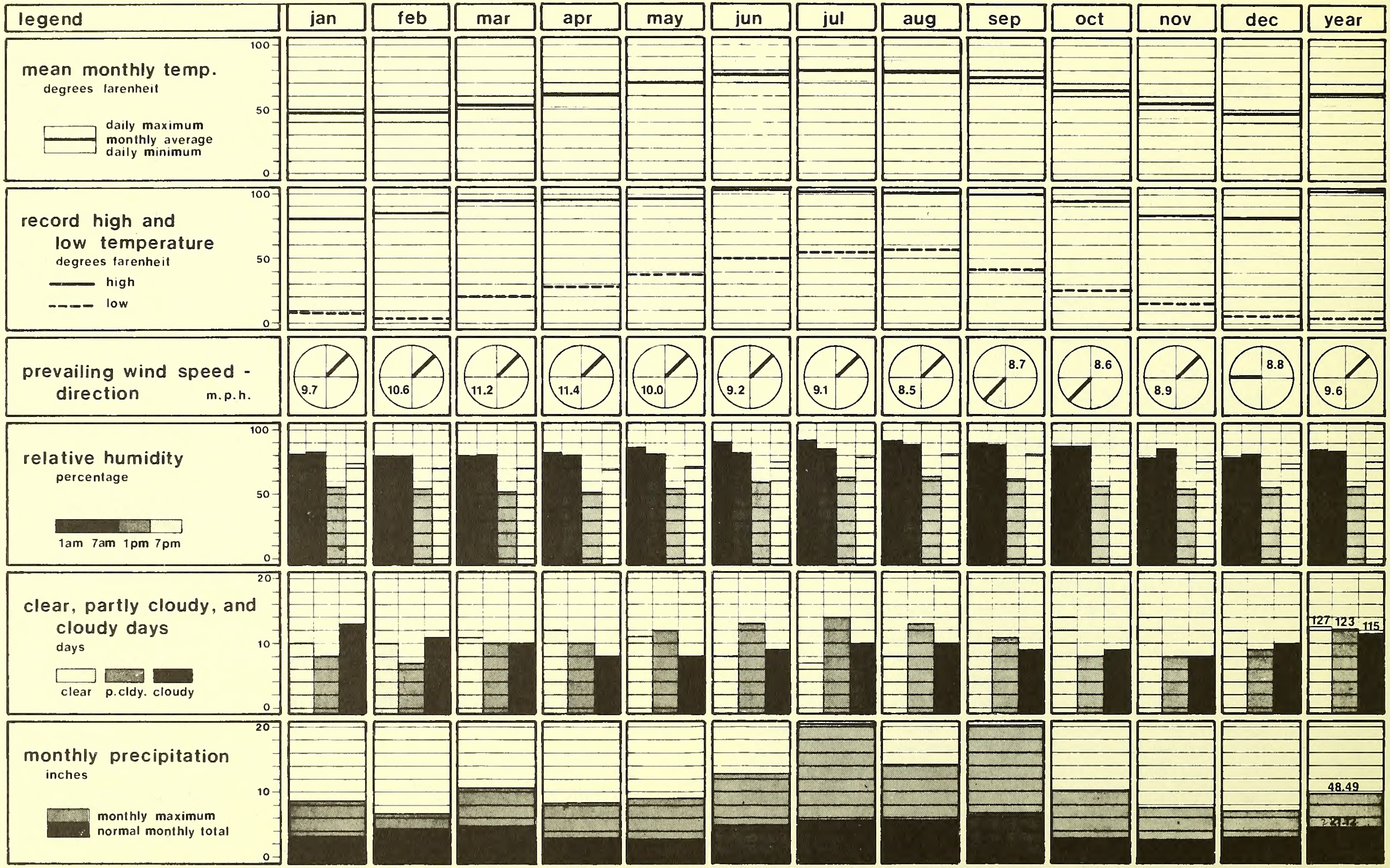
Several theories have been put forth in the past concerning the origin and geologic history of the regional landscape. Of particular interest are the profusion of elliptical or ovoid shaped depressions known as "Carolina Bays" which are found from Virginia to Georgia and concentrated in the Waccamaw region. Indeed, Lake Waccamaw is the largest of the southeastern bays which still contain water.

The earliest well-developed theories on the origin of Carolina Bays were expressed by Melton and Schriever (1932) and Johnson (1942). The former theory proposed that the bays were formed by a massive meteor shower and the latter held that the coastal plain depressions were a function, instead, of the forces of hydrologic and wind action. In a paper presented in December, 1953, Wells and Boyce maintain, in fact, that the origin of the bays are a composite of both earlier theories plus additional factors.

The age of the depressions has been set at about 250,000 years. It is also supposed that the meteorites approached the earth at a low angle from the northwest — southeast trend of the bays. As a result of the impact, repercussions, and heat of the meteorites, the region was devastated of its vegetation cover. The depressions rapidly filled with water and subsequently, massive erosion of the crater rims took place, depositing large amounts of silt into the bottoms of the bays. Over a period of time as the lake edges reforested, erosion reduced and became stabilized.

Over the many thousands of years preceding and following the glacial periods, the bay areas underwent a variety of changes due to climatic variations and frequent burns. Peat was formed in the lakes and continued to develop until exposed by variations in the water table which enabled the development of swamp forests. These swamp forests became the dominant forest type under Indian occupation when they were removed due to the high incidence of fire. The present lakes, it is believed, were formed as a result of extensive peat burns over certain bays near deep drainage basins four to six thousand years ago.

Lake Waccamaw, the largest of the southeast lakes, is also the only lake with a sandy bottom completely around the shore. The peat-filled lake bottom has been isolated in the lake's interior and lying in a northwest-southeast oriented band. There are only two types of deposits at the surface of the present lake basin — sand and pulpy peat. Additionally, Waccamaw is the only southeast bay lake having a neutral — as opposed to very acid-water chemistry. This is explained largely due to a limestone, marl, outcrop which extends for several miles along the northeast side of the lake.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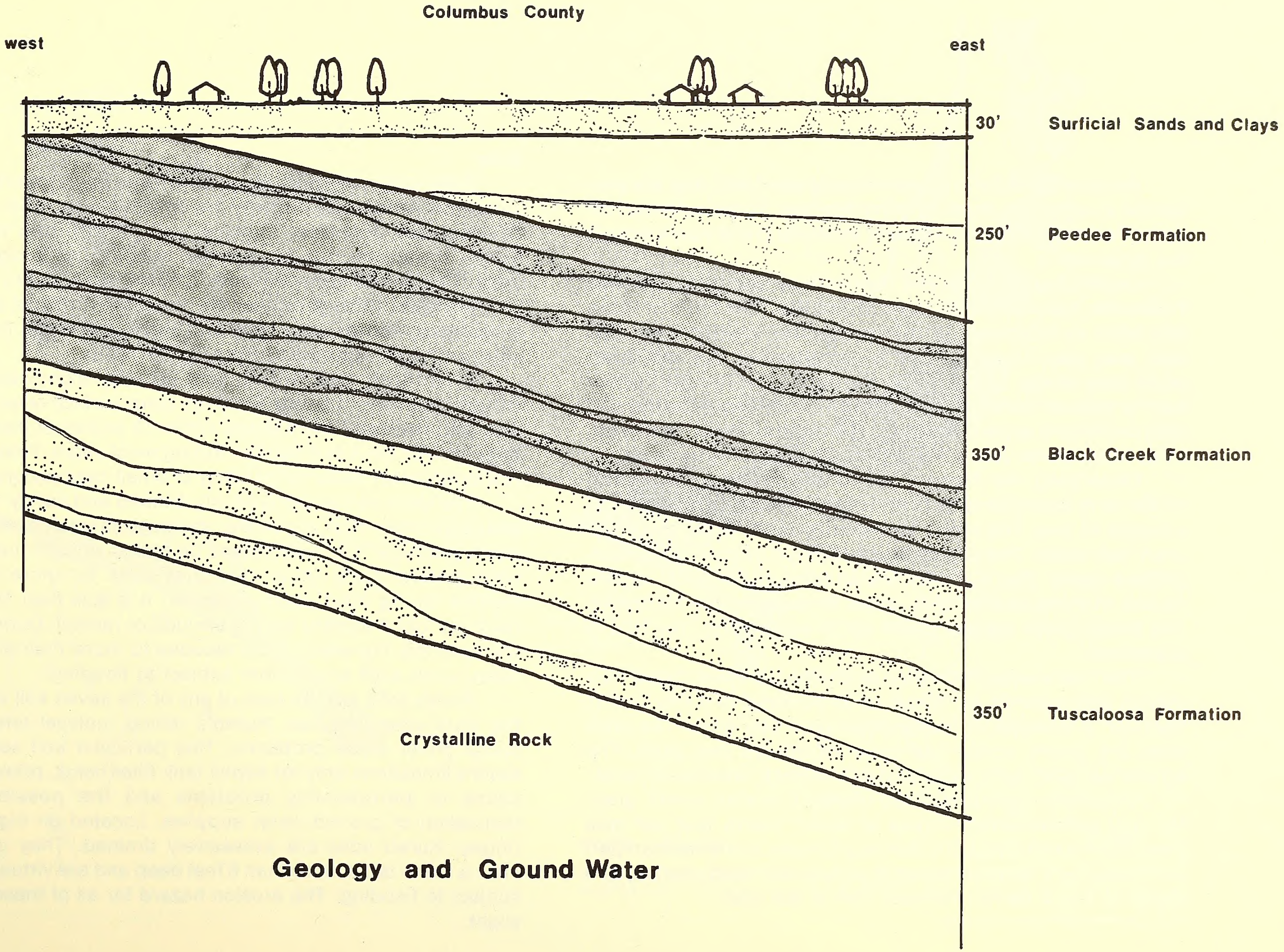


Geology and Ground Water

Surface deposits of predominately sand and clay are present to a maximum depth of thirty-five feet. Water sufficient for some domestic and farm needs is available in this strata though low pressure.

Underlying the sand and clay surface layer is the Peedee Formation extending to a depth of 260 feet. The top half of the formation is composed of fine to medium grained sand and dark gray clay. The lower half is composed of clay with interlaced sand strata, 10 feet or more in depth. The Peedee Formation "crops out" in the western portion of Columbus County and dips southward toward the coast at a slope of about 18 feet per mile. The aquifer yields five g.p.m. per foot of drawdown.

Underlying the Peedee is the Black Creek Formation, made up of layers of sand to thirty feet in depth surrounded by a matrix of clay. The entire formation extends about four hundred feet deep. The predominant material is dark gray, fine-grained sandy clay and very fine to very coarse sand. Lignite occurs in small pieces and layers throughout the formation. The Black Creek aquifer yields six to eight g.p.m. per foot of drawdown.

The Tuscaloosa Formation underlies the Black Creek Formation and extends for about three hundred and fifty feet to bedrock. It consists of interbedded sand and clays. The sand beds are poorly sorted and have micaceous clay beds. The aquifer contains salty water and is, therefore, nondevelopable.

Crystalline rock composed chiefly of gneiss, schist, granite, and metavolcanics slopes at about twenty feet per mile toward the coast through Columbus County. In the western part of the county it is about seven hundred feet deep, sloping to a depth of about eleven hundred feet in the east.

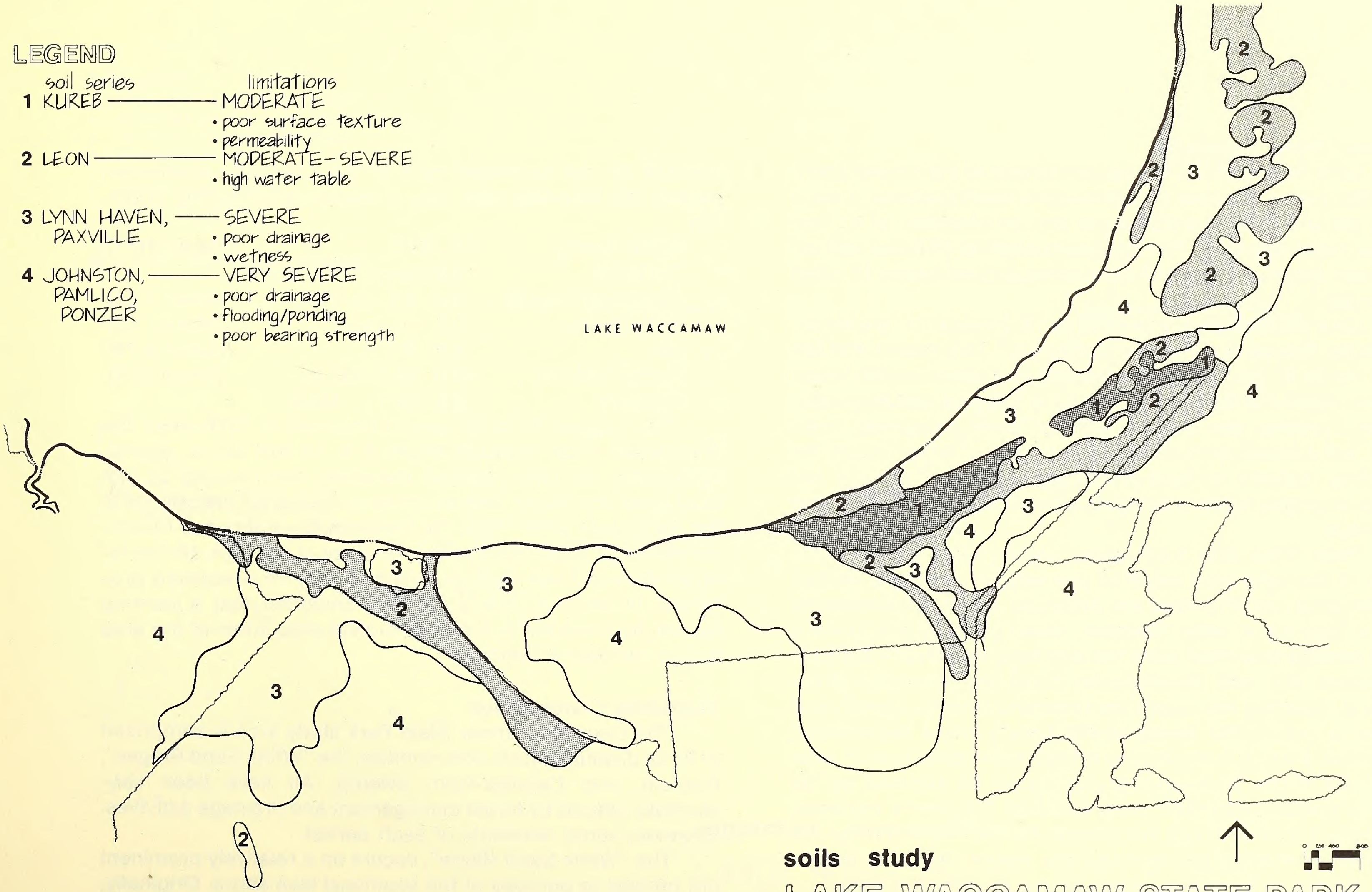
Soils

Soils within the park study area have been classified into seven soil series. The majority are unsuitable for most types of development. Johnston, Pamlico, and Ponzer have the most severe limitations due to wetness, flooding, or a high water table. These soils generally have a nearly level mucky surface with the water table at or near the surface for most of the year. In addition, Ponzer soils have low bearing strength for dwellings, and poor supporting capacity for roads.

Lynn Haven and Paxville soils are only slightly better. Although they have a sandy or sandy loam surface layer instead of muck, the water table is still within 10 inches of their nearly level surface for 4 to 6 months during most years. Paxville also has a tendency towards ponding in small depressions.

The Leon soil series is poorly drained and sandy. But, it is generally better than any of the previously mentioned soils, primarily because it usually occurs on higher ground. Leon soils have a water table 10 to 40 inches deep for more than six months during most years. However, it is less than 10 inches deep for 1 to 4 months during periods of rainfall. During some dry seasons, the water table recedes to more than 40 inches deep. Leon soils are seldom subject to flooding.

Kureb soils are the best of any of the seven soil series on the park site. However, Kureb's rolling, unlevel terrain can cause minor slope problems. This particular soil series has severe limitations only for septic tank filter fields, primarily because of permeability problems and the possible contamination of ground water supplies. Located on high sandy ridges, Kureb soils are excessively drained. They generally have a water table more than 6 feet deep and are virtually never subject to flooding. The erosion hazard for all of these soils is slight.



soils study

LAKE WACCAMAW STATE PARK

columbus county, north carolina

Surface Water Hydrology

Lake Waccamaw is the second largest of the natural Carolina Bay Lakes. Located in southeastern North Carolina, it has a total surface area of 8,936 acres and an elevation of 43 feet above mean sea level. The maximum depth is 10.8 feet with an average depth of 7 feet and a shoreline approximately 14 miles in length.

Lake Waccamaw is classified as "B-Swamp" in its entirety, while the Waccamaw River is "C-Swamp". This means that the best usage of the Lake is for bathing and other contact water sports, while the River's best usage is fish and wildlife propagation, boating, and wading. None of these categories, however, are considered suitable as a source of water supply for drinking, culinary or food-processing purposes. Though the water is usually clear, it is highly colored as a result of swamp drainage.

There have also been some recent water quality problems in the Lake as a result of raw sewage seepage. Neither septic tanks nor pit privies are adequate due to soil limitations and a high water table. However, construction of the new 0.4 mgd sewage treatment plant has significantly reduced this predicament. But, new development along the perimeter of the Lake is offsetting the recent improvement of water quality, and poses a substantial threat to the Lake's future recreational potential. Thus, it is imperative that all development on or near the Lake shore, both existing and future, be serviced by the town's sewage treatment plant. Because the plant's designed capacity is 0.4 mgd, and the present flow is only 0.07 mgd, no problem is anticipated regarding the plant's capability to provide service to developed areas in the forseeable future.

Although a number of water quality sampling stations is located on the Lake, only one has relatively comprehensive data. Located on the southwest side of the Lake, this station recorded the following data over a twelve-month period (1974-75):

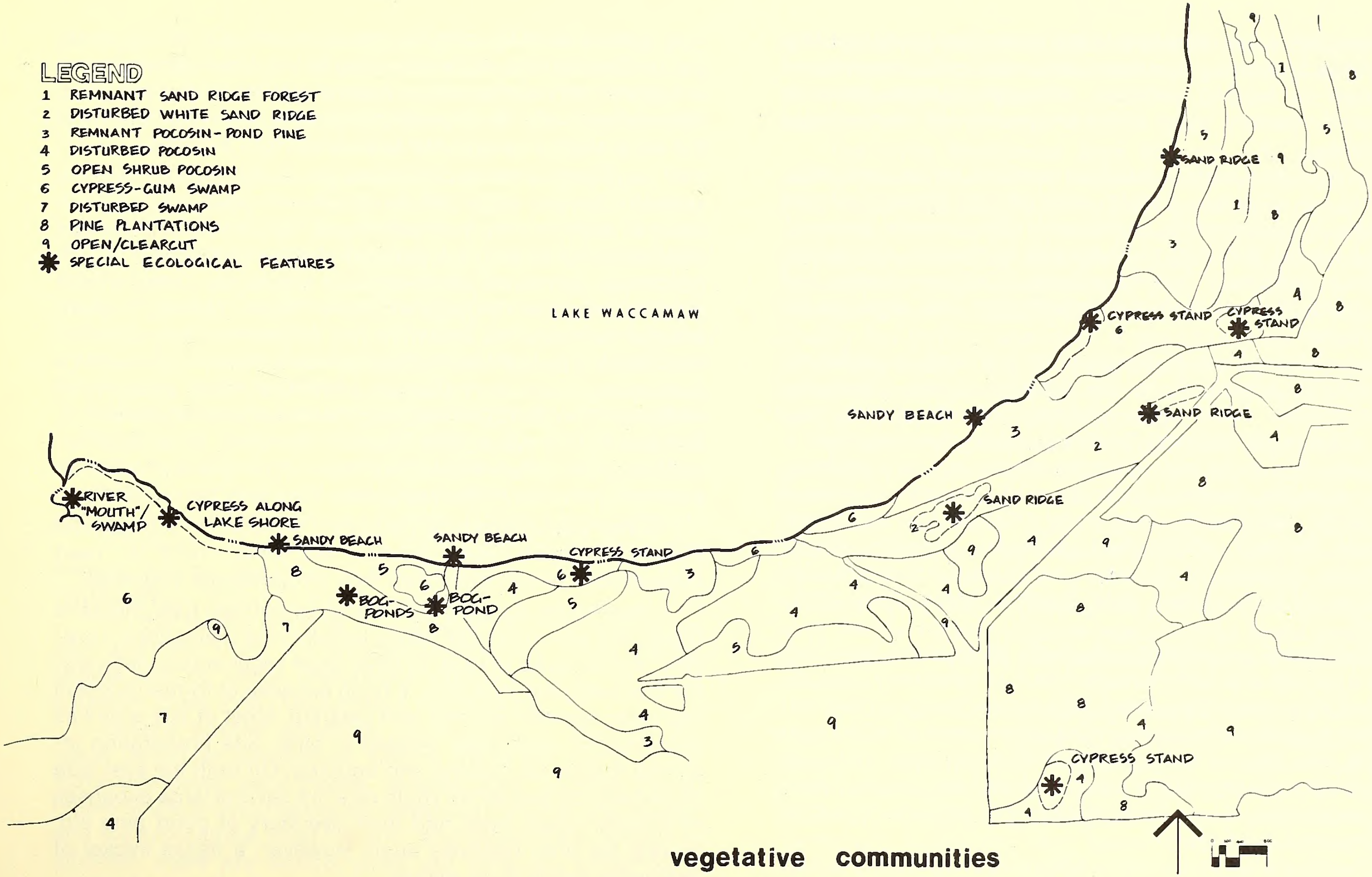
Water Temp	12 - 20°C	(Mean 16° C)
Turbidity	3.9 Hach FTU Mean	
Dissolved Oxygen	6.2 - 8.5 mg/1	(Mean 7.63)
BOD (5 day)	0.3 - 41. mg/1	(Mean 1.06)
pH	4.6 - 8.2	(Mean 6.76)
Fecal Coliform	10.0 - 90.0/100 ml	(Mean 33.3)
Mercury	0.5 UG/1 Mean	

The biggest flood on record occurred in 1928 when the Waccamaw River reached stages 8 to 10 feet above normal. Apparently, the river reached elevations approaching 50 feet m.s.l.(near the dam.) This would have inundated virtually all of the park study area. Thus, the Corps of Engineers has recommended that flood damageable facilities at the park site be located above 55 feet m.s.l. in order that they be adequately protected. In addition, they have recommended that a warning system be provided to insure complete evacuation of the area during periods of flooding.

Vegetative Communities

The Lake Waccamaw State Park study area is comprised of three distinct natural communities: the "White Sand Ridges", Pocosin, and Cypress-Gum Swamp. All have been substantially altered by forest management and drainage activities. However, some remnants of each persist.

The "White Sand Ridge", occurs on a relatively prominent rim parallel to portions of the southeast lake shore. Originally, the sand ridge forest consisted of a long leaf pine (*Pinus palustris*) — wiregrass, (*Aristida stricta*) community. Today,



vegetative communities

LAKE WACCAMAW STATE PARK

columbus county, north carolina

however, only a few remnants of this forest remain. Most of the sand ridge community has been disturbed in the relatively recent past by logging activities. Although portions have regenerated naturally, much of this community has become pine plantations.

Turkey oak (*Quercus laevis*) is common on the sand ridge. Running oak (*Quercus pumila*) may also be present. Shrubs probably include running huckleberry (*Gaylussacia dumosa*), pinnate-leaved false indigo (*Amorpha herbacea*), and poison ivy (*Rhus radicans*). Trailing arbutus (*Epigaea repens*) and sand myrtle (*Leiophyllum buxifolium*) may also exist on the sand ridges.

A number of herbaceous species are likely to inhabit the sand ridges. Among these are Carolina ipecac (*Euphorbia ipecacuanhae*), tread softly (*Cnidoscolus stimulosus*), wire plant (*Stipulicida setacea*), lupine (*Lupinus perennis,* and *L. differsus*), and milk pea (*Galactia erecta and G. regularis*). Other possible species include wild sandhill chickweed (*Alsinopsis caroliniana*), joint weed (*Polygonella polygama*), summer farewell (*Kuhnistera pinnata*), queen's delight (*Stillingia sylvatica*), sandhill spiderwort (*Tradescantia graminea* and *T. rosea*), and Sandhill Moss Pink (*Phlox Hentzii*).

Spikemoss or sandhill selaginella (*Selaginella arenicola*) forms a partnership with reindeer lichen on extremely poor, dry exposed sand ridge sites where little or no other groundcovers are able to survive. Relatively young pines, most of which were planted, can also be found on most of these areas. However, one exposed site near Bella Coola is almost completely devoid of all vegetation. It was likely disturbed in the recent past by earth moving equipment.

The Pocosin-pond communities are much more prevalent within the study area. However, timber harvesting and drainage activities have also significantly disturbed much of these communities. The absence of fire has further altered their original condition.

Remnants of the original pocosin community primarily occur on the lake side of the sand ridges. It is characterized by an evergreen shrub bog with a sparse overstory of pond pine. However, virtually all of the pocosin communities on the side of the sand ridge opposite the lake have been drained.

Pond pine is the dominant tree species associated with the pocosin. Several large shrubs which can attain tree size are likely to occur in the pocosin. These include the loblolly bay (*Gordonia asianthus*), the red bay (*Persea pubescens* and *P. borbonia*), and sweet bay (*magnolia virginiana*). Other shrubs probably include angledstem fetter bush (*Lyonia lucida*), stagger bush (*Lyonia ligustrina var. foliosiflora*), bog-laurel or leucothoe (*Leucothoe axillaris*), fetter-bush (*Leucothoe racemosa*), chokeberry (*Sorbus arbutifolia*), bitter gallberry or inkberry (*Ilex glabra*), honey-cup (*Zenobia cassinifolia* and *Z. pulverulenta*), pepperbush (*Clethra alnifolia*), titi or leatherwood (*Cyrilla racemiflora*), and wax-myrtle (*Myrica cerifera*). Leather leaf (*Cassandra calyculata*) may also be present.

Other plants which can probably be found in the pocosin include: bamboo brier (*Smilax laurifolia*), cane or reed (*Arundinaria tecta*), and chain fern (*Woodwardia virginica).*

Substantial portions of the original pocosin near the sand ridges are now relatively young loblolly pine plantations. However, some areas appear to have been regenerated naturally. Further away from the lake, a huge expanse of former pocosin has been recently drained and clearcut. Most of this area has subsequently also been planted in pine. Site preparation included broadcast burning and bedding. On both the east side of the lake, as well as the south side are several large expanses of pocosin which have had their overstory of pond pine cut, leaving the area relatively open. However, a dense thicket of evergreen shrub does persist.

Cypress-gum swamp communities primarily occur along the Waccamaw River and several relatively small low-lying areas near the lakeshore. Again, drainage and other forest management activities have significantly affected a large portion of the swamp. In addition, several sizeable stands of young even-aged bald cypress exist on the west side of the river.

Bald cypress (*Taxodium distichum*) and tupelo gum (*Nyssa aquatica*) are the species which best characterize the swamp communities. Swamp gum (*Nyssa sylvatica fiflora*) also probably exists in the swamp. A few white cedar (*Chamaecyparis thyoides*) may be scattered in the swamp, but no characteristic even-aged stands are apparent. Swamp red maple (*Acer rubrum var. carolinianum*), the pumpkin and pop ashes (*Fraxinus tomentosa* and *F. caroliniana*), the swamp hickory (*Carya aquatica*) are also likely to be present in the swamp. Sweet gum (*Liquidambar styraciflua*) is common on the borders of the swamp.

Many of the pocosin shrubs can also be found on slightly higher ground in the swamp, as well as the margins of the swamp. In addition, the swamp rose (*Rosa palustris*), swamp dogwood (*Cornus stricta*) and two or three species of viburnum. Possum haw (*Viburnum nudum*) is the most common.

Practically no herbaceous flora is to be found in the swamp proper. However, in the drier areas, the chain fern (*Woodwardia virginica*) may be expected.

On the swamp margins, two vines which climb high in the gum and other trees, are especially noteworthy. These are the supple-jack or rattan (*Berchemia scandens*) and the more common cross vine (*Anisostichus capreolata*).

Several special ecological communities or features deserve particular recognition. Among these are some of the more prominent sand ridges, isolated pure cypress stands (some of which occur along the lakeshore), several bog-ponds, and the Waccamaw River "mouth" and its adjacent swamp. In addition, there are several small but intriguing forest communities which lie on the west side of the river, deep in the swamp. Speculatively speaking, these areas could possibly be remnant bog-bays. Very conspicuous on aerial photographs, they should be investigated in much greater detail on the ground. Efforts should be made to preserve and interpret all of these features as well as the remnant swamp, pocosin, and sand ridge communities.

Fauna

The Lake Waccamaw area abounds with wildlife. The swamp forest is a prime habitat for the black bear (*Ursus americanus*), particularly where black gums occur. Other mammals include the marsh or swamp rabbit (*sylvilagus palustris*), gray squirrels (*sciurus carolinensis*), bobcat (*Lynx rufus*), and raccoons (*Procyon lotor*). The gray fox (*Urocyon cinereoargenteu*) is probably also present. In the wetter areas, including the shallow shoreline of the Lake, river otter (*Lutra canadensis*), and mink (*Mustela vison*) are definitely present. Beaver (*Castor canadensis*), and muskrat (*Ondatra zibethica*) are also likely in these same habitats.

Eastern whitetail deer (*Odocoileus virginianus*), and opossum (*Didelphis marsupialis*) can be found throughout the study area. The longtail weasel (*Mustela frenata*), striped skunk (*Mephitis mephitis*), and cottontail rabbits (*sylvilagus floridanus*) may also be present. The latter two, however, are more likely to be found in or near the more open areas. The southern flying squirrel (*Glaucomys volans*) is possibly present, while the fox squirrel (*Sciurus niger*) may be found among the sand ridges within the remnant longleaf pine-wiregrass community.

A number of bats possibly inhabit the study area. Included are the little brown myotis (*Myotis lucifugus*), silver-haired (*Lasionycteris noctivagans*), eastern pipistrel (*pipistrellus subflavus*), big brown (*Eptesicus fuscus*), red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), evening bat, (*Nycticeius humeralis*), the seminole (*Lasiurus seminolus*), eastern yellow (*L. intermedius*), and the eastern big-eared bat (*Plecotus rafinesquei*).

Small rodents probably include the eastern harvest mouse (*Reithrodontomys humulis*), cotton mouse (*Peromyscus gossypinus*), golden mouse (*P. nuttalli*), eastern woodrat

(*Neotoma floridana*), rice rat (*Oryzomys palustris*), meadow vole (*Microtus pennsyvanicus*), pine vole (*Pitmys pinetorum*), least shrew (*Cryptotis parva*), short-tail shrew (*Blarina brevicanda*) and eastern mole (Scalopus aquaticus).

The American alligator (*Alligator mississippiensis*) heads the list of numerous reptiles and amphibians. Among these are the eastern cottonmouth (*Agkistrodon piscivorus piscivorus*), southern copperhead (*A. contortrix contortrix*), pygmy (*Sistrurus miliarius*), canebreak (*Crotalus horridus*) and eastern diamond back (*Crotalus adamanteus*) rattlesnakes.

Many species of migrating waterfowl use the shallow areas contiguous to the park study area as loafing sites during early and mid-winter months. The swamp area along the Waccamaw River and the several small cypress ponds near the lake provide excellent habitat for the wood duck (*Aix sponsa*), and numerous other waterfowl. Other game species probably include the wild turkey (*Meleagris gallopavo*), eastern bobwhite quail (*Colinus virginianus*), and mourning dove (*Zenaidura macroura*).

Fish habitat is excellent both in the lake and the river. Lake Waccamaw is considered to be the most productive of any bay lake in southeastern North Carolina. Furthermore, the Waccamaw River is one of the better fishing streams in Eastern North Carolina.

Thirty-six different species of fish have been found in Lake Waccamaw. Typical game fishes in the lake are largemouth bass, white perch, shellcracker, bluegill, crappie, yellow perch, pumpkinseed and warmouth. Longnose gar, white catfish, flat bullhead, yellow bullhead, carp, gizzard shad, eastern lake chubsucker and bowfin are representative non-game fishes that are present in Lake Waccamaw. Three endemic species are unique to the lake; these include the Waccamaw Darter, Waccamaw killifish, and Waccamaw Silverside. In addition, an endemic Mollusk Elliptio Waccamawansii, can be found in the Lake and River.

In the river, major game fishes are largemouth bass, chain pickerel, redfin pickerel, bluegill, redbreast sunfish, warmouth, and black crappie. Further downstream, flier and yellow perch can also be found.

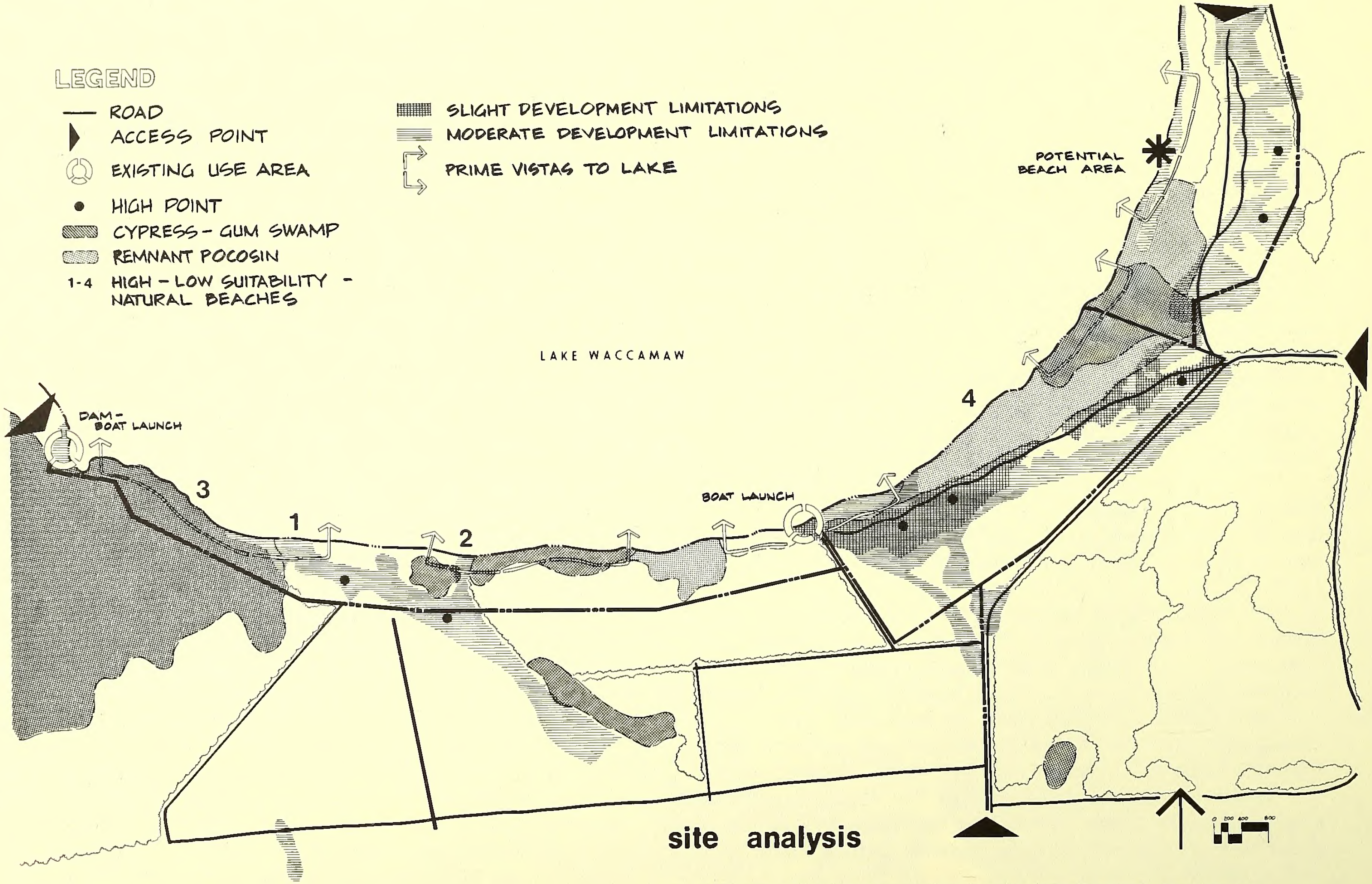
Fishery management efforts by the North Carolina Wildlife Resources Commission have been restricted primarily to the lake. These efforts have been concentrated in stocking largemouth bass, bluegill, shellcracker, and redbreast sunfish. Threadfin shad were stocked in an effort to introduce another suitable forage fish in Lake Waccamaw. The introduction of tire shelters to create additional cover has proven very effective in concentrating fish.

Past management practices, included slightly lowering the water level each winter, with a 3-4 foot drawdown about every eight years. However, 1974 fishery biologist recommendations suggested discontinuance of this practice. Future plans for continued improvement of fishing in Lake Waccamaw include placement and marking of additional tire shelters and continued research for other suitable forage fish.

Site Analysis

The most important physical conditions of the site may be correlated and represented in composite form in the site analysis. As a result, priorities indicating the suitability of land for park use and the need for protection of certain land may be established. The location of access points into the site in relation to the various use suitability areas establishes a planning framework to which alternative park programs may be applied. Planning is further limited by the location of particular features on the site such as rare plants, natural beach areas, and existing trails.

At Lake Waccamaw, the soil conditions are most limiting to park development for reasons outlined previously. Indeed, the soils best suited for the establishment of roads, parking lots, and buildings are located on the Council tract and form the sand ridges lying roughly parallel to the lake. Soils having moderate limitations for development extend also along the



site analysis

LAKE WACCAMAW STATE PARK

columbus county, north carolina

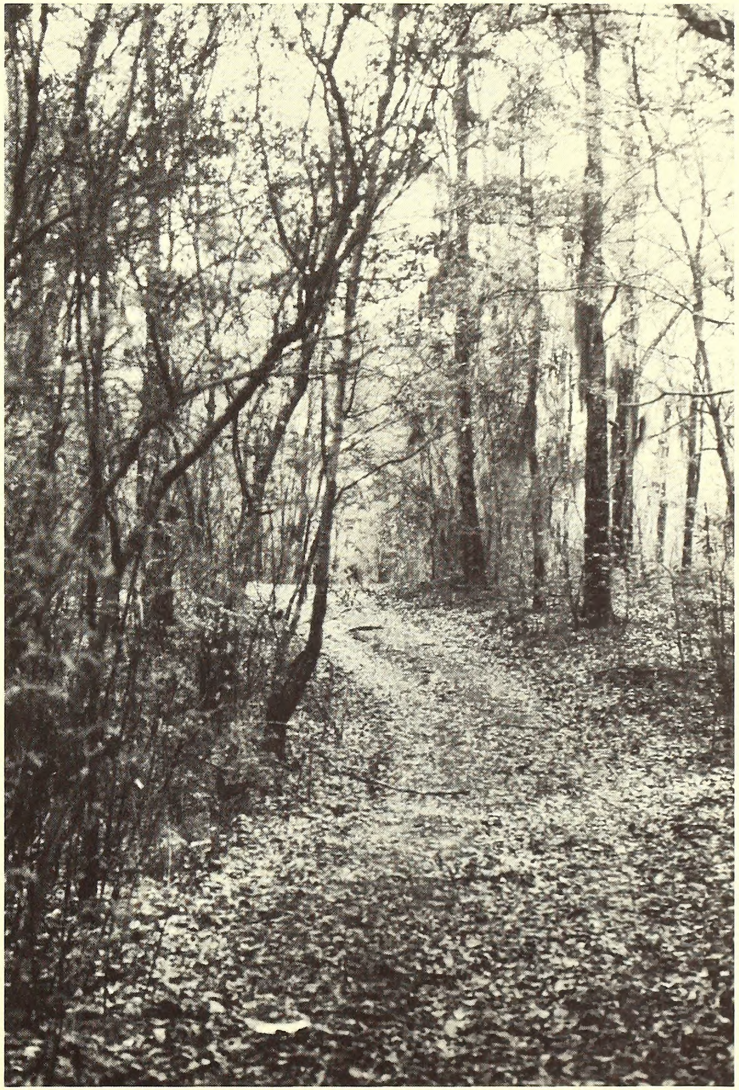
sand ridges of the Bella Coola property and to the south of the Walters tract. At only three locations do these soils adjoin the lakeshore. Certainly most of the land in the area, including the shoreline, is not well suited for intensive park usage.

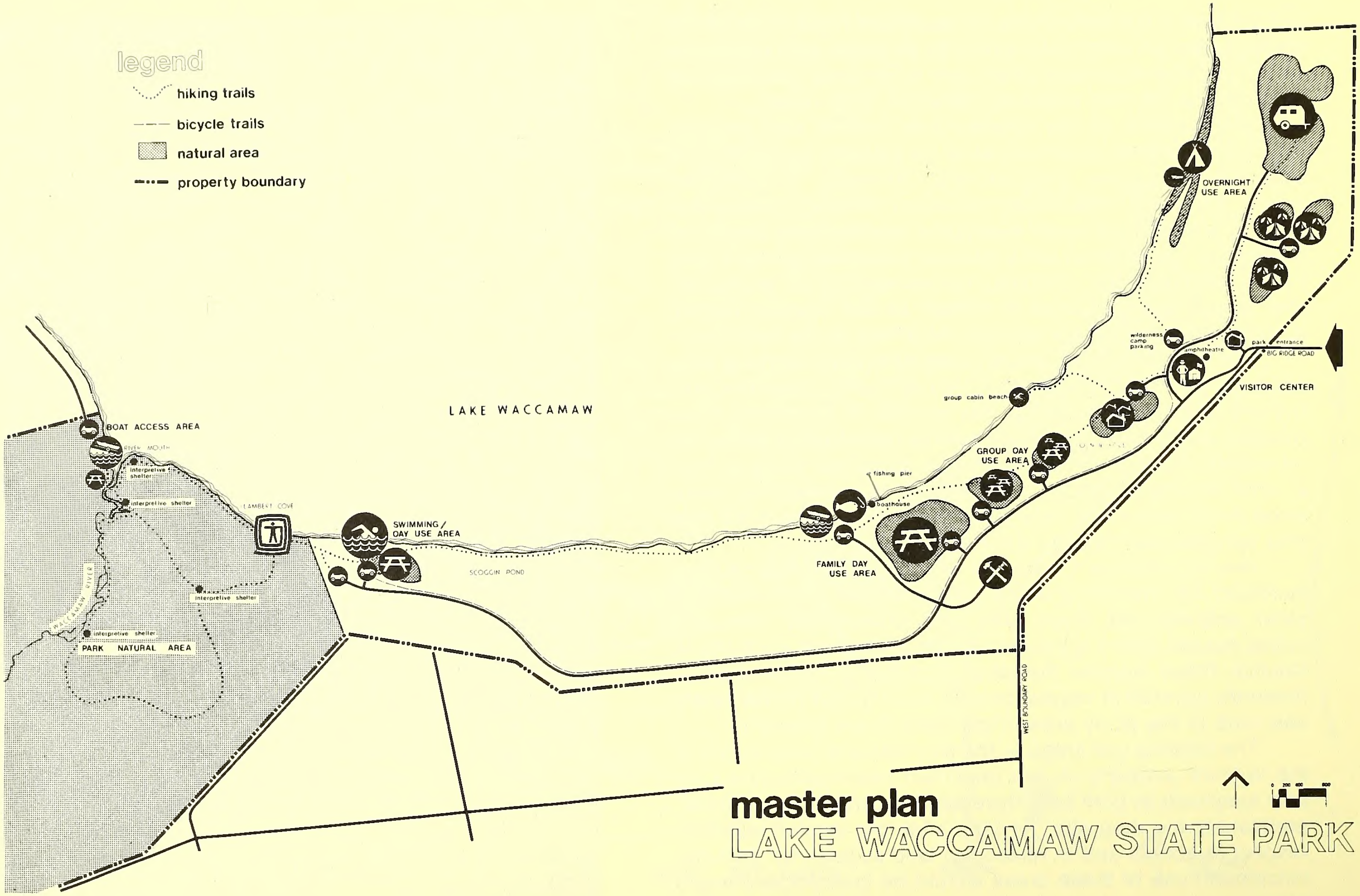
The location of the cypress-gum swamp and remnant pocosin vegetation communities is particularly important to a potential interpretive program and, generally, a protection policy. These are areas which have been relatively undisturbed and, as a result, represent ecological communities worthy of protection. These areas are particularly interesting where they adjoin the lakeshore. Certainly highest priority for protection and interpretive purposes is placed on the cypress-swamp lake-edge ecology which extends 3400 feet to the lake dam.

The swamp and pocosin are very different in terms of their accessibility. While the swamp is very difficult to negotiate during wet weather, particularly, the pocosin is practically inaccessible at all times. Where the swamp community adjoins the lakeshore, there is, characteristically, a narrow ridge of high ground running parallel to the lake edge. Movement may occur along these ridges and, as a result, many fine views to the lake may be observed through the tree canopy.

Natural beaches on the site are ranked in order of their suitability for swimming areas based on their relationship to other potential use areas, size, and accessibility. The best suited natural beach is located on the Walters property where Council Ridge adjoins the lake. A potential beach area — presently covered in vegetation — is also located on the northeast side of the study area in the Bella Coola property.

The existing use areas — the dam site and boat launch at the Walters' property — are important constraints to a park plan inasmuch as both have developed historic patterns of use, particularly the dam site. As both sites are located well with respect to access and in relation to land suitable for park development, use of these areas should be incorporated into a plan.





master plan
LAKE WACCAMAW STATE PARK

MASTER PLAN SYMBOLS KEY

- VISITOR'S CENTER
- RANGER RESIDENCE
- MAINTENANCE AREA
- PARKING
- INTERPRETIVE WORKSHOP
- ⬢ INTERPRETIVE SHELTER
- FAMILY PICNICKING
- GROUP PICNICKING
- SWIMMING
- BOAT RAMP
- FISHING
- BOAT DOCK
- FAMILY TENT & TRAILER CAMPING
- FAMILY WILDERNESS CAMPING
- CABIN CAMP
- GROUP TENT CAMP

DEVELOPMENT PROPOSALS

Concept

The Master Plan concept divides the site into six major areas: Park Entrance, Day Use (family and group), Swimming-Day Use, Natural Area, Boat Access at Dam, and Overnight. Facilities for both families and organized groups are included. In addition, a Visitor Center and an Interpretive Workshop have been proposed.

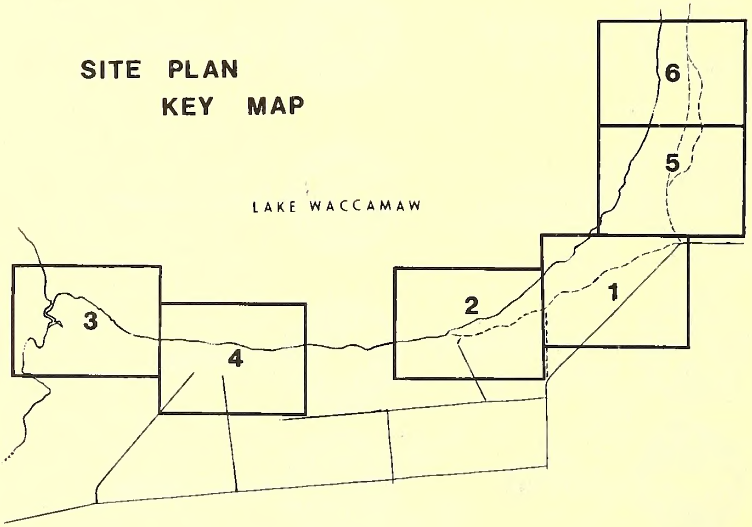
In between these areas, development will be limited primarily to hiking, backpacking, interpretive, and bicycle trails. These will link the major activity units together. Thus, the undeveloped areas will serve as buffers. Furthermore, their natural character will be maintained or reclaimed as the case may warrant.

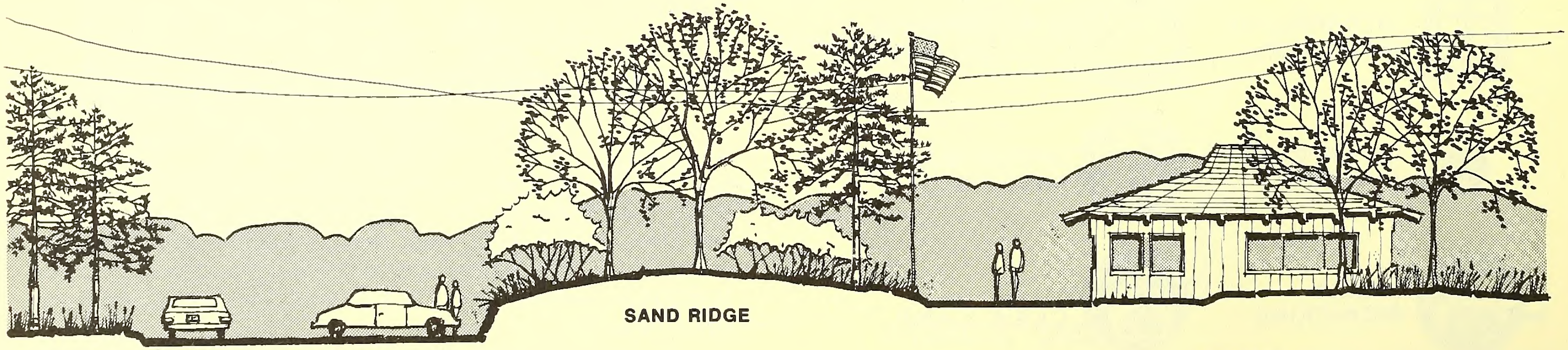
Master Plan

park entrance

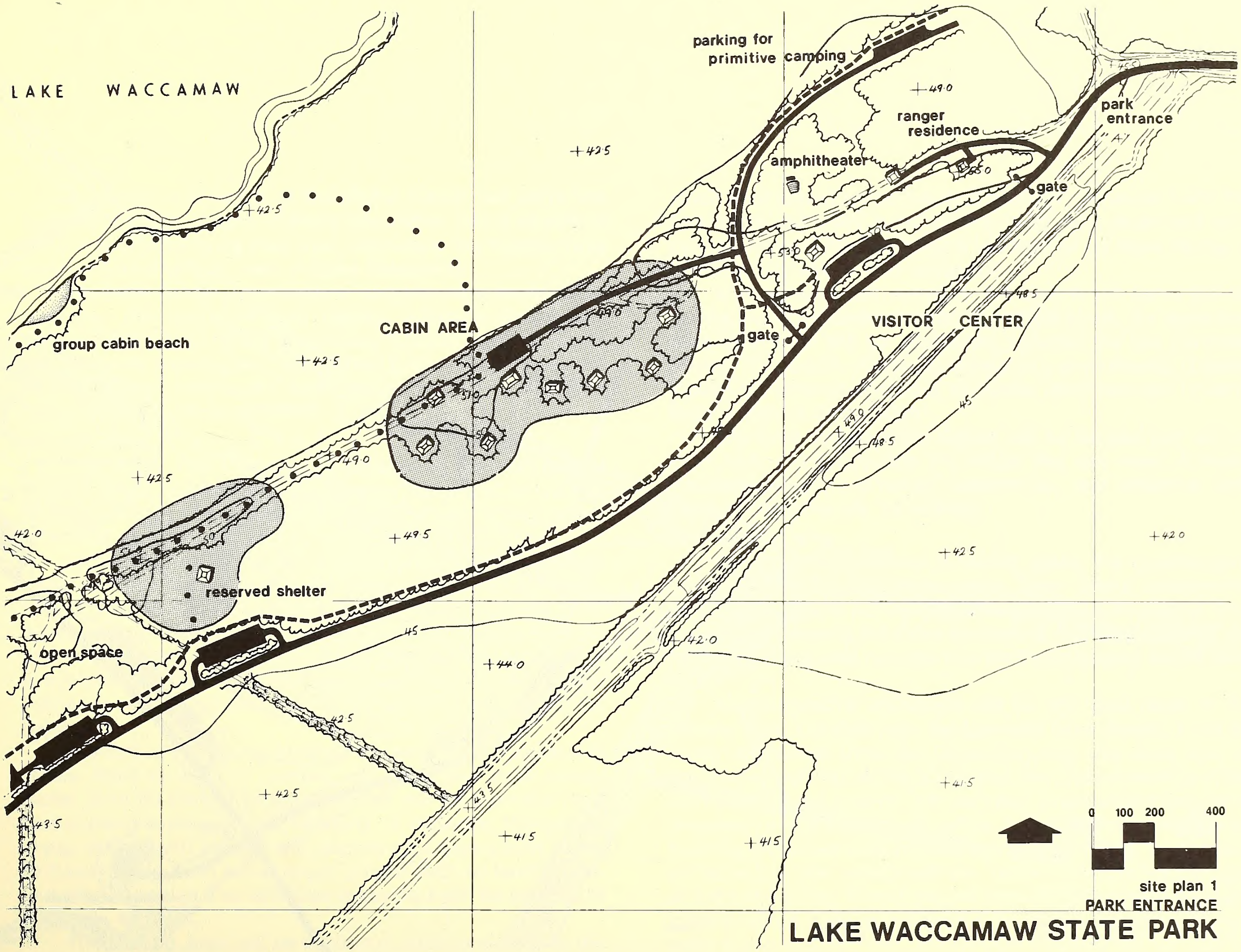
A single main entrance will provide vehicular access to all of these areas except for the boat access area at the dam. By way of existing unpaved roads from N. C. Highway 211, the main park access road will enter the park near Council Ridge. It will be directed first towards the Visitor Center and then will diverge towards the Day Use and Overnight use areas. The Boat Access Area at the dam will be served by a separate entrance road from Waccamaw Shores.

Located near the main park entrance, the Visitor Center will serve a number of functions. Providing visitor orientation and information would be the primary purpose of the center. Also, the center will serve administrative and control functions with staff office space and visual access to and from the main park road.

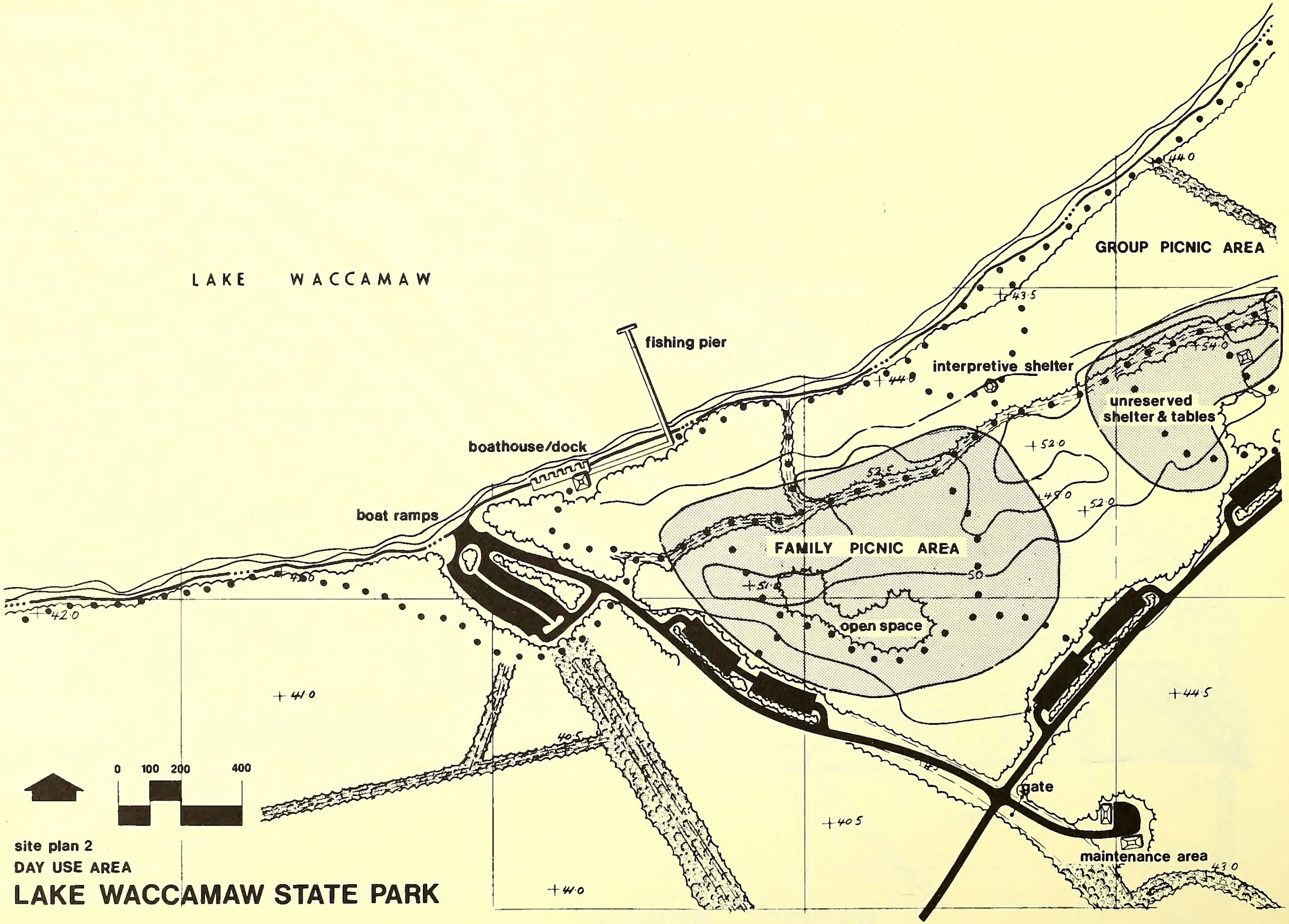




VISITOR CENTER



site plan 1
PARK ENTRANCE
LAKE WACCAMAW STATE PARK



site plan 2
DAY USE AREA
LAKE WACCAMAW STATE PARK

A bicycle concession at the Visitor Center will serve the park bicycle trail system. Visitors may either rent a bicycle at the concession or bring their own. Ultimately, the bicycle trails may be linked to the Town of Lake Waccamaw.

Near the Center, a 150-person amphitheatre would serve both day and overnight park visitors. Although nature and natural history talks will be its primary function, cultural topics would also be appropriate. Also related to the Visitor Center will be two ranger residences and parking for Family Primitive Camp users.

day use area

The major Day Use Area is situated at the west end of Council Ridge. It will provide facilities for family and group picnicking, fishing, and small boat access. All will require water, toilet and parking facilities.

Picnicking will be divided into three distinct types in order to serve the various users. Substantial open space will be required for each to accommodate various field games and other activities. The Family Picnic Area will be comprised of single and paired tables with grills and trash receptacles. However, it is not intended that the whole area be utilized simultaneously. Rather, a rotation system will be set up for periodic site rehabilitation.

The Group Picnicking Area will be comprised of clusters of tables, three to eight in number, with grills and trash receptacles. One 60-person capacity shelter will be included on a first-come-first-serve basis. However, a separate 150-person group shelter with kitchen will operate on a reservation basis. Its function will be to serve larger groups such as family reunions who must plan their activities in advance and be assured of adequate facilities.

The Fishing Area will be located in close proximity to the picnic areas and small boat ramps. A boathouse with a bait and snack concession will be the focal point. In conjunction with the boathouse, 80 small rental fishing boats with docks are proposed. Because the shoreline is too shallow for bank fishing, a 300-500 foot pier is also proposed.

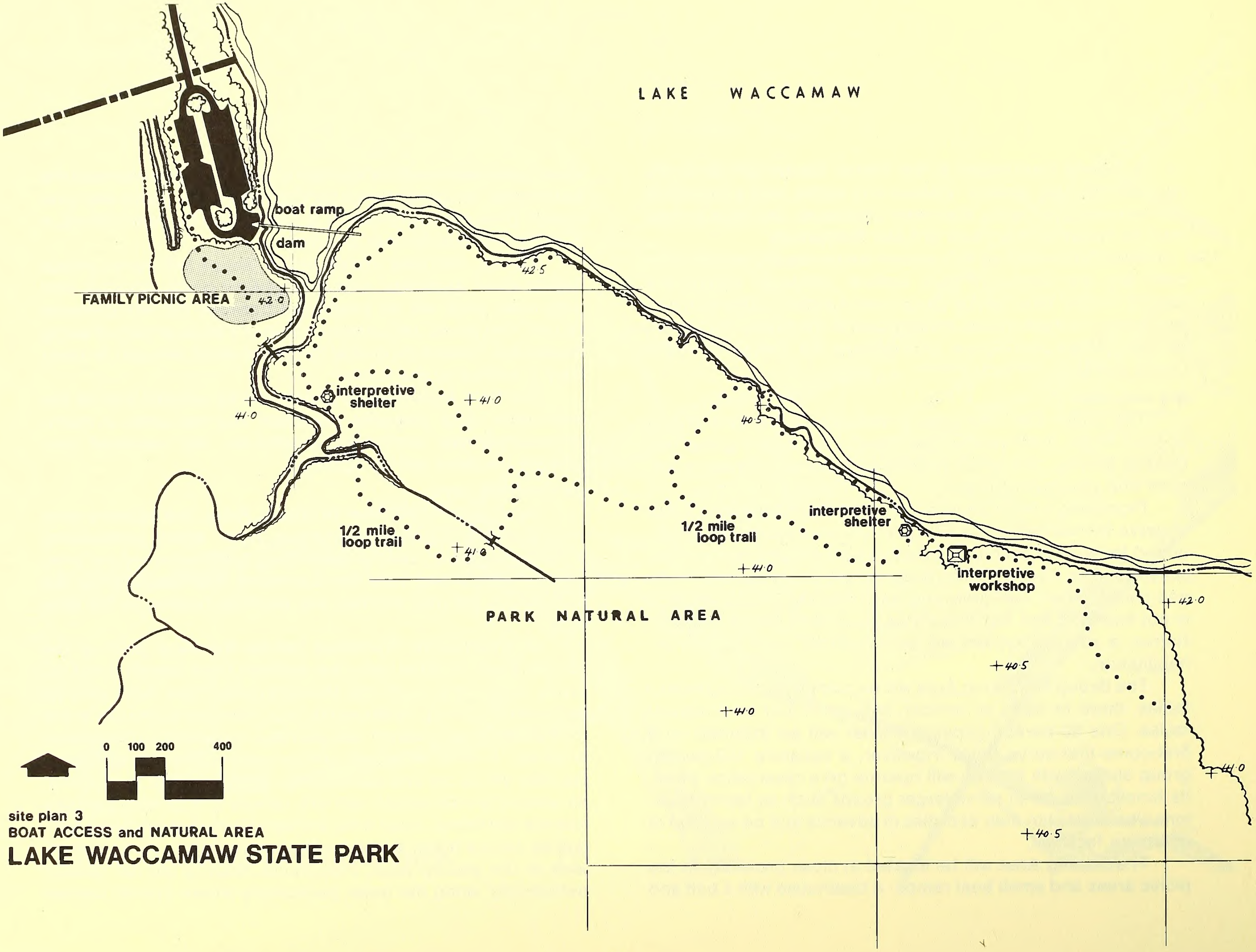
Nearby, two boat ramps and a launch will serve private fishing boats as well as similar recreation boats. An eight-foot wide boat dock will be positioned between the two concrete ramps. The launch will simply consist of a short stretch of easily accessible cleared shoreline for boats small enough to carry from a vehicle to the water.

The Park Maintenance Center will be located just off the main park road, opposite the major day use area. A maintenance garage, workshop, warehouse, and seasonal employees barracks will be needed.

park natural area

Relatively undisturbed in recent years, the cypress-gum swamp bordering the Waccamaw River offers outstanding potential as a park natural area. Thus, a 650-acre natural area has been proposed from the Swimming-Day Use Area on the east side of the river corridor into the River Swamp on the west side.

An Interpretive Workshop will be the focal point of the natural area. Located near the Lambert Cove Beach, it will be easily accessible from the Swimming-Day Use Area and its associated parking. At the same time, the close proximity of the workshop to the swamp will permit a substantial interpretive program. A work area, lab, office, meeting area, and display facilities will all be incorporated into the workshop. In addition, an extensive trail system will link various interpretive features and the workshop. Such trails will include both guided and self-guided nature trails, a trail for the handicapped, and a boardwalk in the swamp itself. Interpretive shelters will be located periodically along the trails, particularly where special natural

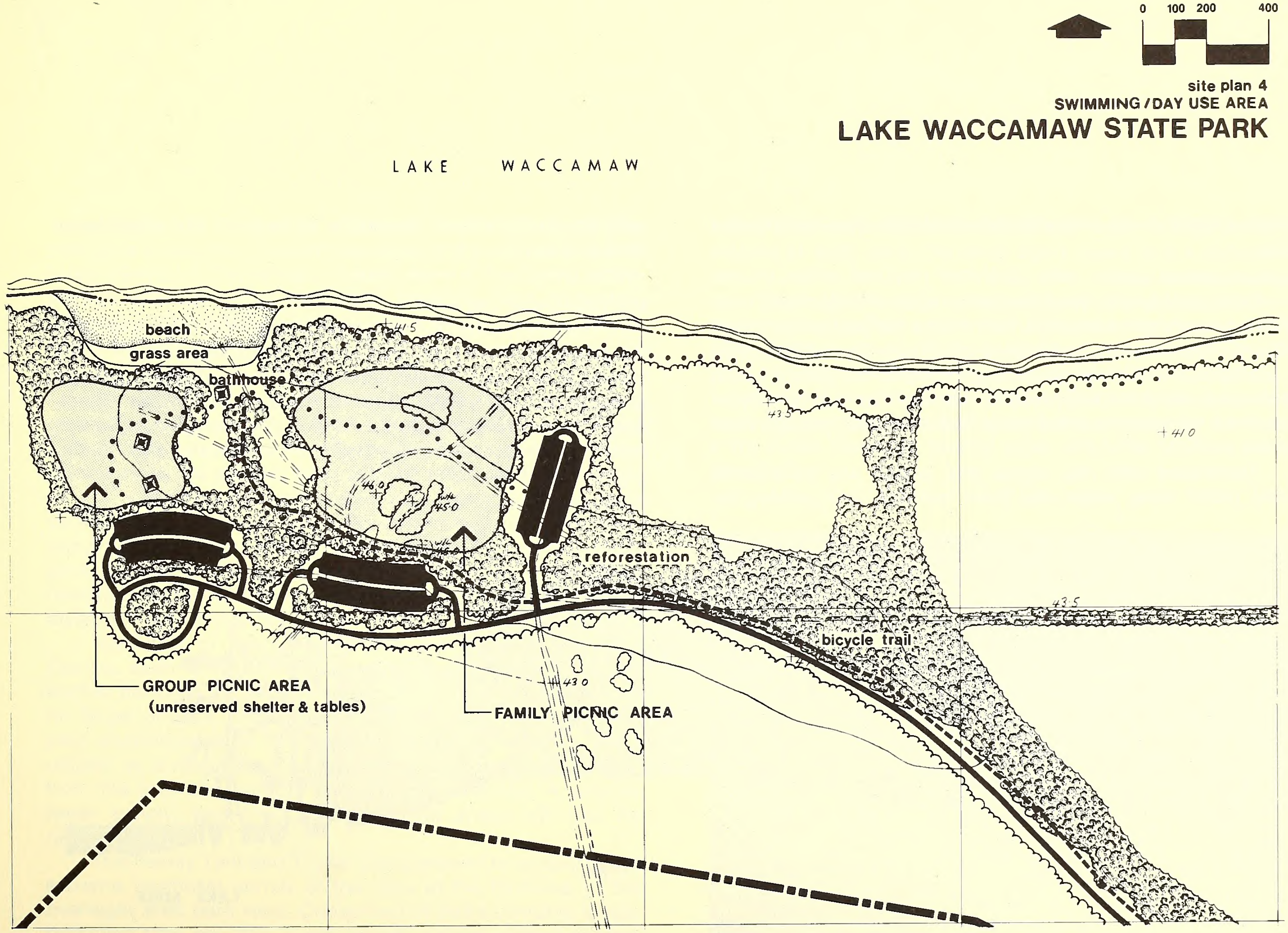


site plan 3
BOAT ACCESS and NATURAL AREA
LAKE WACCAMAW STATE PARK

site plan 4

SWIMMING / DAY USE AREA

LAKE WACCAMAW STATE PARK



features merit more extensive interpretation than signing can offer.

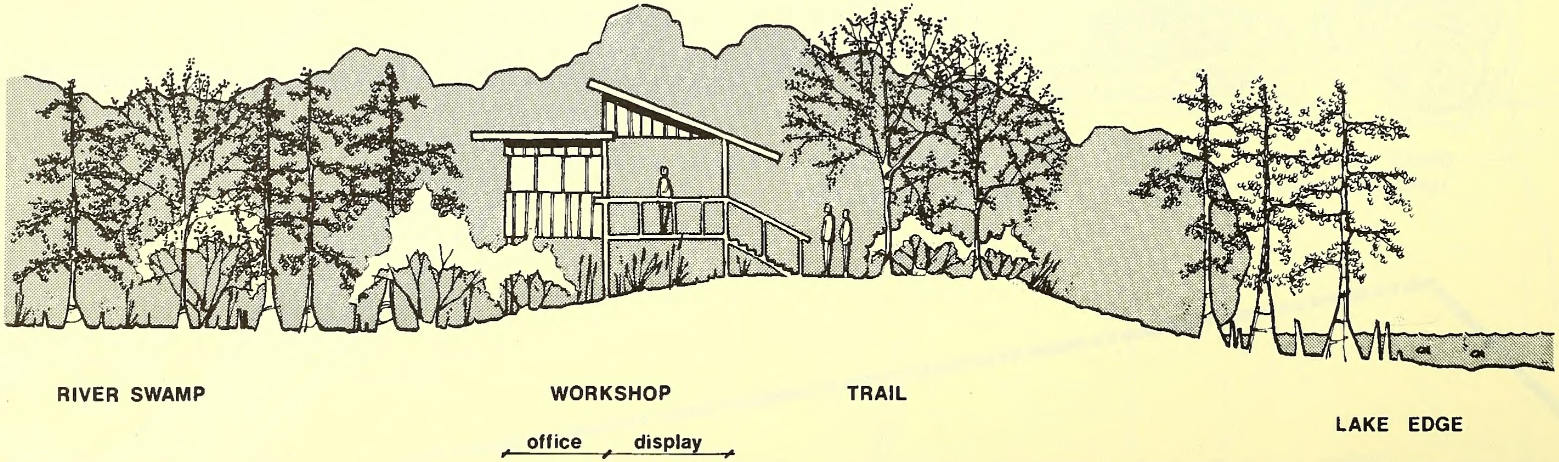
boat access at dam

Boat access will be provided to both the lake and river from the west side of the dam. Two ramps, at least one of which will accommodate larger recreational boats, will provide access to the lake. A dock will be located between the ramps and a third ramp will provide access to the river for fishing craft. A launch for canoes and other small boats will also provide river access.

Associated with the ramps and launch will be a small family picnic area, water and toilet facilities, and parking for vehicles and trailers. Access is by way of the Waccamaw Shores Road.

swimming-day use area

The Swimming-Day Use Area is located at the terminus of the proposed main park road, west of the Scoggin Pond. It will feature a 600-foot natural sand beach with adjacent grassed area for wading, sunbathing and various other beach associated activities. Either a pier or floating dock will give swimmers access to deeper water. A refreshment concession with changing rooms, water, toilet facilities, and parking will serve beach users.



INTERPRETIVE WORKSHOP

Adjacent to the beach, additional family and group picnicking is proposed. However, because of the complete lack of forest canopy in this vicinity, at least some of the family tables will be situated within individual shelters. One 60-person capacity shelter will be included in the group area on a first-come-first-serve basis.

overnight area

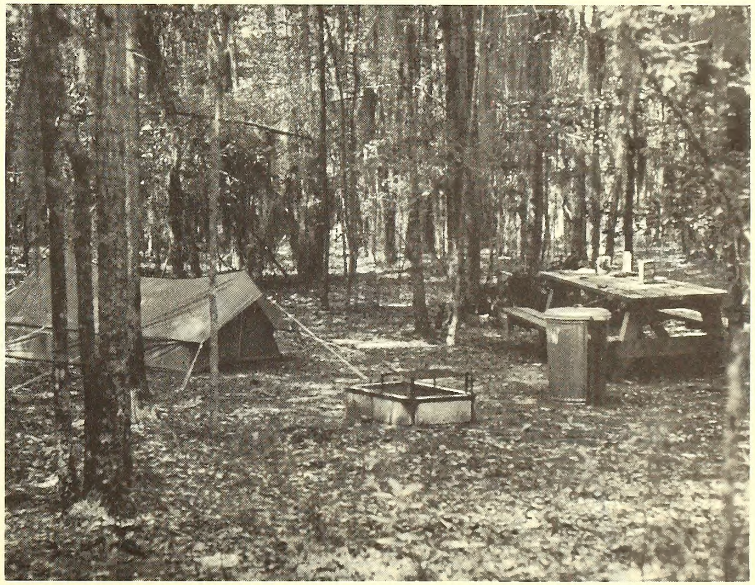
The Overnight Area is comprised of a number of different camping-related activity areas. Located primarily on Jones Ridge, it can be reached from the main park road at the Visitor Center.

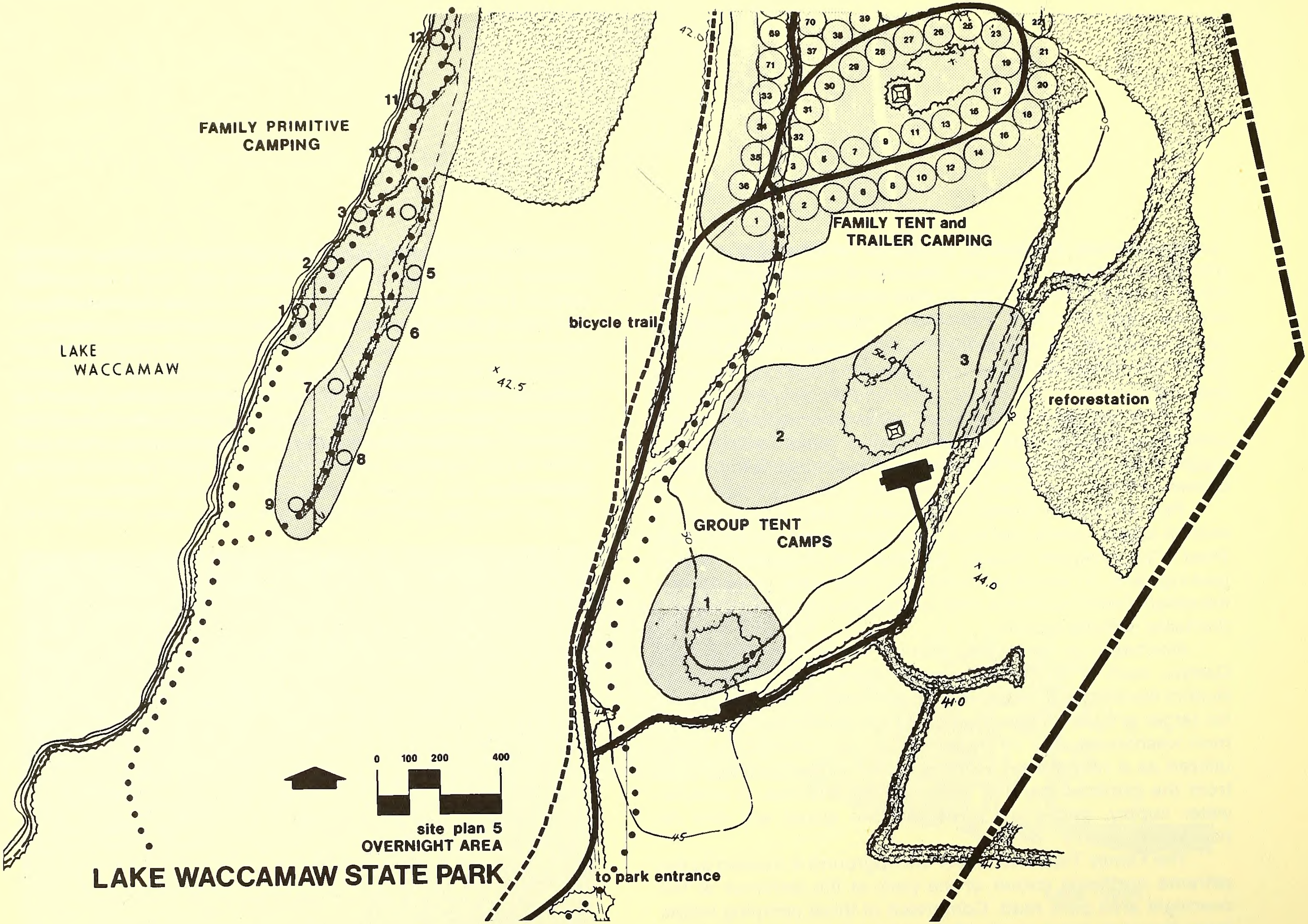
Near the Visitor Center is the Cabin Camp. This area consists of seven cabins having a capacity of eight persons each fitted with minimum kitchen facilities and fireplace. Central parking and a common mess hall will help provide the necessary flexibility for the area to facilitate both groups and individuals, simultaneously.

Northeast of the Visitor Center are three Group Tent Camps, each of which will accommodate up to 50 persons. Built-in flexibility will allow two of these areas to function as one for larger groups. These two camps will be served by a common washhouse. The third tent camp area is intended to be utilized as a rough camp with minimal facilities. A short walk from the provided parking areas will be required. A potable water supply, and 1½-2 acres of open space will also be necessary.

The Family Tent and Trailer Campground is located in the extreme northeast corner of the park at the terminus of the overnight area park road. Comprised of three camping loops, thirty-five sites per loop, it will provide individual back-in sites for recreational vehicles and sand or gravel pads for tents. Each site will also include a grill, picnic table and trash receptacle. One washhouse with toilet and water facilities will be located in each loop. Common open space and a substantial natural buffer between individual sites will be maintained.

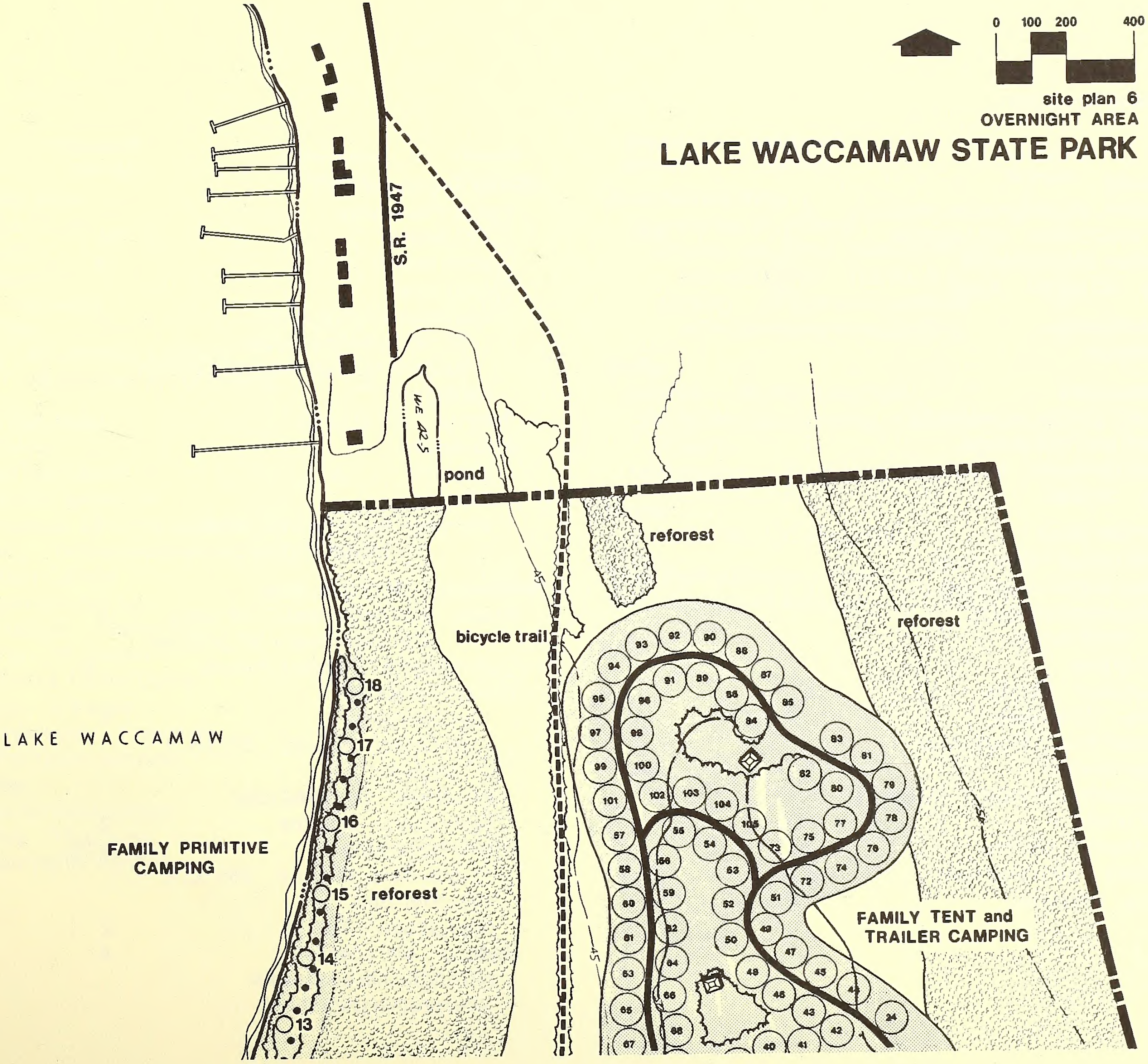
Family Primitive Camping will be provided along the lakeshore near the Tent and Trailer Campground. Access will be either hike-in or by boat. A small dock will accommodate boaters, while a backpacking trail will link this camping area to a parking lot near the Visitor Center. Each of these sites will be relatively primitive with only a small cleared area for a tent and a fire circle. However, central water and toilet facilities will be provided.





site plan 5
OVERNIGHT AREA

LAKE WACCAMAW STATE PARK



site plan 6

OVERNIGHT AREA

LAKE WACCAMAW STATE PARK

Development Program

	Developed Acreage	People Per Day
Visitor Center		
Information, administration, displays	2	
Bicycle concession 60 bicycles	.1	240
150-person amphitheatre	.25	
Parking 20 visitor 4 bus	.25	
Ranger Residences		
2 residences		
Maintenance Area		
Workshop, garage, warehouse	1	
Workyard and fuel pumps	1	
Seasonal barracks 18 persons	.5	
Parking 18 staff	.1	
Group Day Use Area		
Reserved Group Picnic Area		150
1 group shelter w/kitchen	1	
150 person capacity		
1600+sq. ft		
20 tables		
open space 2 acres	2	
parking 40 spaces	.3	
Unreserved Group Picnic Area		
1 group shelter	1	60
60 person capacity 600 sq. ft.		
8 tables		
open space 2 acres	2	
9 clusters 36 tables total	2.25	432
parking 50 paces	.5	

	Developed Acreage	People Per Day
Family Day Use Area		
Family Picnicking		
120 tables	15	1200
open space	2	
Fishing Area		
boathouse/concession	1	400
80 rental fishing boats		
bait and refreshment concession		
fishing pier		376
Parking 160 spaces	1.5	
Boat Access		225
2 ramps	.2	
1 launch	.1	
parking 60 vehicles & trailers 30 vehicles w/out trailers	1.5	
Swimming — Day Use Area		
Beach 600 linear feet x 100' sand 600 linear feet x 50' grassed	2	2686
Concession & Changing Rooms	.5	
Group Picnicking		
1 group shelter	1	60
60 person capacity 600 sq. ft.		
8 tables		
6 clusters 28 tables total		336
open space 2 acres	2	
Family Picnicking	6.25	500
12 two-table shelters 285 sq.ft.		
50 tables total		
open space 2 acres	2	
Parking 440 spaces	4	
(40 additional spaces for interpretive workshop)		

	Developed Acreage	People Per Day
Boat Access Area		
2 ramps on lake	.2	180
1 river ramp	.1	75
1 river launch	.1	75
Family Picnicking		120
12 tables	1.5	
Parking 90 vehicles & trailers	2	
30 vehicles w/out trailers	.25	
Overnight Use Area		
Cabin Camp		100
7-8 person cabins	5	
1 common mess hall		
open space 2 acres total		
parking 14 spaces	.25	
Group Tent Camps	15	150
3-50 person camps		
open space 4 acres total		
parking 36 spaces	.3	
Family Tent & Trailer Camp	36	416
3 loops 104 sites		
3 washhouses 1 per loop		
Family Primitive Camping	18	72
18 sites		
1 dock for boat access		
parking 18 spaces (near visitor center)	.2	

	Developed Acreage	People Per Day
Park Natural Area		
Interpretive Workshop	.2	600
display, lab, office, meeting room, and work area 750 sq. ft.+		
parking 40 spaces (combined with swimming area parking)	.4	

Trails

Bicycle — 20,200 linear feet

Hiking and Backpacking — 27,200 linear ft.

Interpretive — 15,600 linear feet

Roads

Paved — 34, 400 linear feet

Total Park Acreage — 1650

Total Developed Acreage — 132.8 or 8%

MANAGEMENT PLAN

Projected Park Use

Based on an analysis of recreation supply, demand data for specific activities, potential opportunities afforded by the site, and a detailed analysis of attendance records and trends in similar state parks, approximately 240,000 visitors per year are projected for Lake Waccamaw State Park. An additional 12,000 people per year are expected to utilize park facilities for river access. However, these figures represent visitation after major use facilities in the park have been provided. Long range projections predict an additional average annual increase of about 1.6% based on current North Carolina State Park System trends.

The design capacity of the park is 3,943 visitors in any one day. However, this number is expected only on major spring and summer holidays and peak weekends. The average annual daily attendance will probably be about one sixth of this figure or about 650 persons per day. It is also assumed that the majority of park visitors will engage in more than one activity.

Services to Park Users

Programs operating in other State Parks relating to park security, visitor protection, fire prevention, and information services will also be established at Lake Waccamaw State Park. Park patrolling will occur both by foot and mobile units equipped with two-way radios. Permits for camping, and general information concerning the park plan and facilities will be available at the Visitor Center.

A park bus service is proposed to provide an alternative means of transportation to the park and its activity areas. The primary purpose of the service is to alleviate traffic congestion which can be expected to increase on lakeshore roads as a result of park development. Inasmuch as a bus service would be geared to providing a primarily local service, it may be appropriate for its cost and management to be born by the Town, and possibly shared by the Park. Ultimately, it would be intended that a maximum of two busses having a capacity of twenty to thirty persons operate simultaneously and on a regular schedule during the peak season. The bus, originating at the Visitor's Center, would travel the lakeshore roads stopping at key points in the town such as the Wildlife Access Areas. The last stop would be at the Park's access area at the dam and the return trip would involve the same series of stops.

Environmental Management

Much of the Lake Waccamaw State Park site has been clearcut in the recent past. Fortunately, most of this area has been replanted in loblolly pine.

In those areas where replanting has not occurred, the quickest, most acceptable method of establishing forest cover is to plant genetically superior loblolly or slash pine. Prior to planting, however, site treatment will be necessary. Prescribed burning and use of a roller-chopper after burning would probably be an effective site treatment. Bedding may also be necessary, particularly where drainage efforts have not adequately reduced the water table level. This process will make feasible the establishment of a mature pine forest in thirty years or less.

On the open sand ridges, an attempt should be made to reestablish the original longleaf pine-wiregrass community. However, this will require an active maintenance program including periodic prescribed burning. This would be especially valuable for interpretive purposes.

Where possible, establishment of a "hardwood" forest would be preferable to pine. Although this objective would take a few years longer, fast growing intolerant hardwoods like sycamore, yellow poplar and sweetgum are considered superior to pine for recreation lands. These species are not suitable where extremely wet or dry conditions persist such as the swamp and sand ridges respectively. Site preparation is similar to that for pine.

Portions of the area designated for reforestation should include scattered game food plots. This will greatly increase the fauna capacity of the local habitat.

Nuisance vegetation, including naiad and water lily, have infested parts of the lake for some time and are particularly bothersome near various private piers. In the past, spot treatment with an approved herbicide by homeowners has been recommended, under the direction of State Parks. However, future nuisance vegetation treatments should only occur if and when it can be established that the approved herbicides are in no way detrimental to other aquatic life, particularly the various endemic species.

The North Carolina Wildlife Commission is currently managing fishery resources in the Lake, as well as the two wildlife access areas. The N. C. Division of Parks and Recreation is responsible for maintaining "no wake zones", pier regulations, and regulating the lake level. These same responsibilities should continue with periodic review of management policies.

Land Acquisition

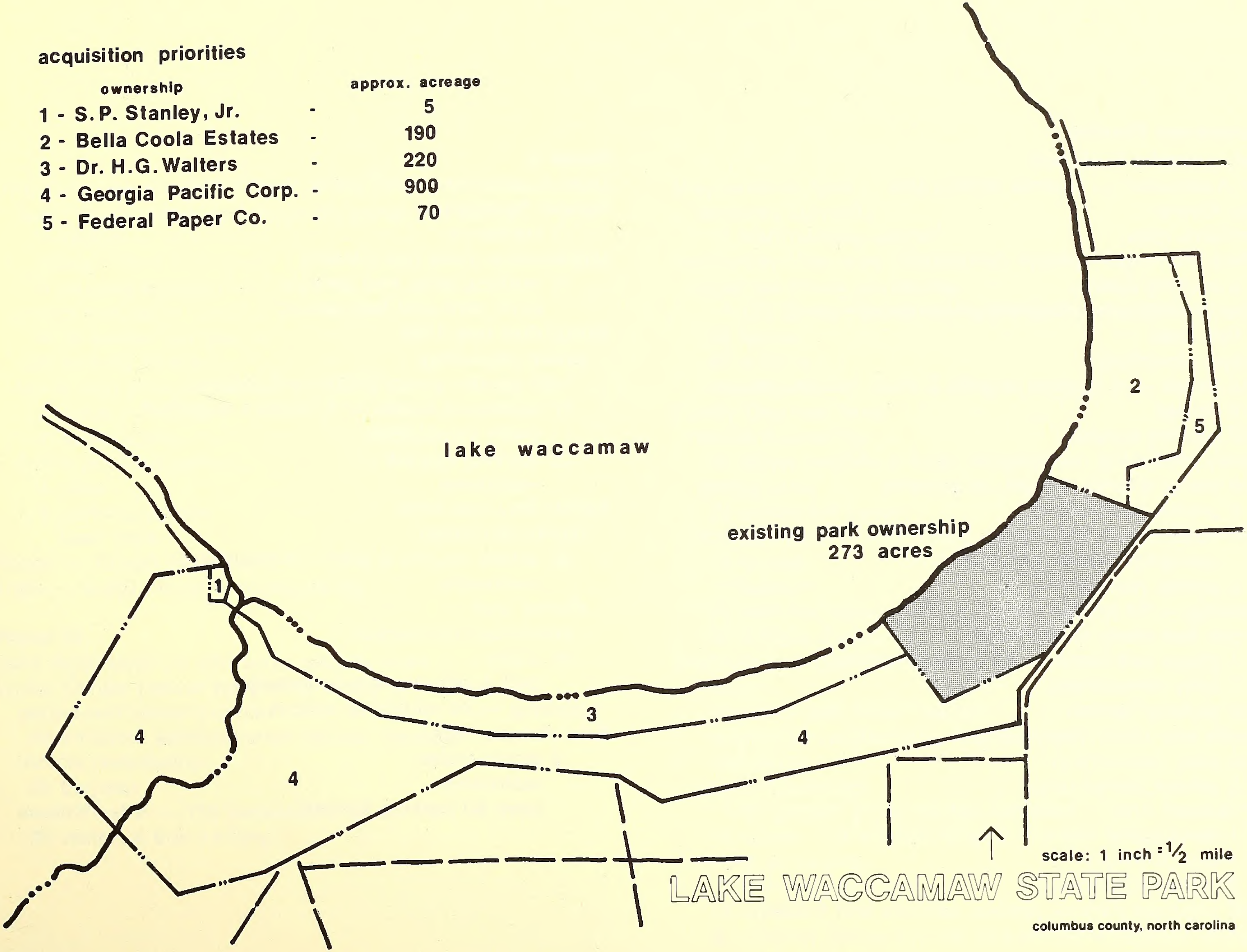
In order for the Park Master Plan to be implemented, additional land must be acquired. Land acquisition will be geared to bring into the Park's ownership land which will be used to accommodate recreational facilities, establish a park natural area, and to provide necessary buffer to the Park's activity areas. The strategy and subsequent priorities for acquiring land are aimed first at the two extreme edges of the proposed park. This is done in order that land most susceptible to private development may be isolated to insure against its development and to protect interior lands from development. Additionally, these two sites represent important access areas for proposed park use and development. Once these parcels are acquired, other intermediate lands may be purchased to establish the park natural area and link the access points into one contiguous parcel.

The land acquisition plan proposes that Lake Waccamaw State Park ultimately be comprised of approximately 1658 acres. Presently, the park owns 273 acres along the lakeshore. Priorities one and two for land acquisition — the parcels at the extreme edges of the proposed park boundary — consist of 5 acres west of the lake dam and 190 acres north of the existing park land owned by Mr. S. P. Stanley, Jr. and Bella Coola Estates, respectively. Priority three consists of approximately 220 acres and is owned by Dr. H. G. Walters. Its acquisition would provide a continuous shoreline in park ownership. Priority four, approximately 900 acres owned by the Georgia-Pacific Corporation, includes the mature swamp land associated with the Waccamaw River which would be included in the proposed Park Natural Area. Priority five is aimed at acquiring, for buffer purposes, approximately 70 acres from the Federal Paper Company.

Of particular importance to the implementation of the Lake Waccamaw State Park Master Plan is the need for a written access agreement through Federal Paper Company property. It is hoped that communications with Paper Company representatives, which are occurring presently, will result in a permanent agreement at an early date.

acquisition priorities

ownership		approx. acreage
1 - S.P. Stanley, Jr.	-	5
2 - Bella Coola Estates	-	190
3 - Dr. H.G. Walters	-	220
4 - Georgia Pacific Corp.	-	900
5 - Federal Paper Co.	-	70



LAKE WACCAMAW STATE PARK

columbus county, north carolina

Development Phasing

Phase I (Interim Facilities)

Land Acquisition — 5 acres priority one
Visitor Center
  entrance gate
  office/information station (temporary)
    6 parking spaces
  maintenance area (temporary storage and yard)
Day Use Area
  group picnicking
    12 tables — 3 clusters w/grills & trash receptacles
    2 privies
    25 parking spaces
  family picnicking
    20 tables w/grills & trash receptacles
    2 privies (temporary)
  swimming beach (temporary public day use)
    changing rooms (temporary)
    2 privies (temporary)
  parking — 80 spaces
  group tent camp (temporary)
    1 group tent camp — 12 sites (temporary)
    1 privy (temporary)
    12 parking spaces
  family tent camp (temporary)
    12 sites (temporary)
    2 privies (temporary)
Boat Access Area
    1 ramp (lake)
    1 launch (river)
    2 privies (temporary)
    60 unpaved parking spaces, vehicles and trailers
  Roads — 7400 linear feet
  Trails — 8400 linear feet hiking

Phase II

Land Acquisition — 190 acres priority two
Ranger Residences
    1 residence
Maintenance Area (permanent)
    1 working shop and garage
      work yard and fuel pumps
Group Day Use Area
  group picnicking
    1-60 person group shelter w/8 tables
    12 additional tables — 3 clusters w/grills & trash receptacles
    25 parking spaces
      restrooms
Family Day Use Area
  family picnicking
    40 tables w/grills & trash receptacles
      restrooms
  fishing area
    boathouse/concession
    20 boats
      bait & refreshment concession
  parking — 70 additional spaces
Boat Access Area
    6 picnic tables
      restrooms
      pave 60 parking spaces

- Overnight Use Area
  - cabin camp (replaces temporary group tent camp)
    - 7 cabins
    - mess hall
    - 14 parking spaces
  - group tent camp
    - 2-50 person camps
    - 24 parking spaces
  - family tent & trailer camp
    - 3 loops — 34 sites
    - 1 washhouse
  - family primitive camp
    - 6 sites
    - 6 parking spaces
    - boat dock
- Roads — 10,400 linear feet
- Trails — 9,200 hiking & backpacking

Phase III

- Land Acquisition — 220 acres priority three
- Visitor Center (delete temporary family tent camp)
  - permanent visitor's center
    - information, administration offices, displays
  - bicycle concession
    - 30 bicycles
  - amphitheatre — 150 persons
    - 20 visitor; 4 bus parking
- Maintenance Area
  - seasonal barracks
    - 8 staff parking spaces
- Group Day Use Area
  - reserved group picnicking
    - 1-150 person group shelter w/kitchen facilities
    - 20 tables
    - 40 visitors
    - restrooms
- Family Day Use Area
  - family picnicking
    - 30 tables w/grills & trash receptacles
  - fishing area
    - 20 additional boats
  - boat access
    - 2 ramps
    - 1 launch
    - 60 vehicles trailer parking spaces
    - 30 vehicle spaces
- Swimming — Day Use Area
  - beach
    - establish 600' linear beach
    - concession w/changing rooms
    - restrooms
  - group picnicking
    - 1-60 person group shelter w/tables
    - 12 tables — 3 clusters w/grills & trash receptacles
  - family picnicking
    - 6-two table shelters
    - 12 tables
    - 20 outdoor tables w/grills and trash receptacles
  - parking — 200 visitor spaces

Overnight Use Area
  cabin camp
    replace temporary public beach w/cabin camp beach
  family tent & trailer camp
    1 loop — 36 sites
    1 washhouse
  family primitive camp
    6 sites
    6 parking spaces
Roads — 16,600 linear feet
Trails — 9,600 linear feet hiking & backpacking
    8,200 linear feet interpretive trail
    8,800 linear feet bicycle trail

Phase IV
Land Acquisition — 970 acres priorities 4 and 5
Visitor Center
  bicycle concession — 30 additional bicycles
Ranger Residences
    1 residence
Maintenance Area
    1 warehouse
Group Day Use Area
  group picnicking
    12 tables — 3 clusters w/grills & trash receptacles
  family picnicking
    30 tables w/grills & trash receptacles
  fishing area
    40 boats
    fishing pier
  parking — 40 additional visitors spaces

Swimming — Day Use Area
  group picnicking
    16 tables — 3 clusters w/grills & trash receptacles
  family picnicking
    26 tables w/grills & trash receptacles
  parking — 240 spaces (including 40 for interpretive workshop)
Boat Access Area
    1 ramp on lake
    1 launch on river
    6 picnic tables w/grills & trash receptacles
  parking (paved)
    30 vehicles
    30 vehicles w/trailers
Overnight Use Area
  group tent camp
    1-50 person camp
    parking — 12 visitor
  family tent & trailer camp
    1 loop — 34 sites
    1 washhouse
  family primitive camp
    6 sites
    6 parking spaces
Park Natural Area
  Interpretive Workshop
    displays, lab, office, meeting room, work area,
  parking — 40 spaces (combined w/swimming, parking)
Trails — 7,400 linear feet interpretive trail
    11,400 bicycle trail

Staffing

PHASE I

Permanent	Ranger-Naturalist II
	General Utility Man
Seasonal	Park Attendant
	Naturalist
	(3) Life Guards
	(2) Concession Operators
	Labor Support (as needed)

PHASE II

Permanent	Superintendent-Naturalist II
	Ranger-Naturalist II
	General Utility Man
Seasonal	(2) Park Attendants
	Naturalist
	(3-5) Life Guards
	(2) Concession Operators
	Labor Support (as needed)

PHASE III

Permanent	Superintendent — Naturalist II
	Ranger — Naturalist II
	Maintenance Mechanic I
	General Utility Man
	Seasonal Secretary
	Ranger Naturalist
Seasonal	(2) Park Attendants
	Concession Manager
	(3-5) Bathhouse/Concession Operators
	(3-5) Life Guards
	Naturalist
	Labor Support (as needed)

Utilities

Soil conditions prevailing in the proposed park area present particular problems to the provision of sewer disposal systems in the park. Inasmuch as all soil series have severe limitations in their capacity to support septic tanks, other means of sewage disposal must be sought prior to the park's development beyond the interim stage.

Presently, public sewer is being extended from the western town limits along the shore roads to the dam. The existing sewer system extends to the eastern and western limits of the Town of Lake Waccamaw. Ultimately, it is the expressed desire of town officials and regional planners to extend the sewer along the eastern shore of the lake though funding for such a project is not expected to materialize in the near future.

Three alternatives exist for the provision of sanitary sewer facilities in Lake Waccamaw State Park. First, a self-contained, "package" treatment plant could be provided on-site to service all park development. Secondly, the public sewer which will terminate near the dam on the west side of the lake could be extended across the dam and along the shoreline of the lake to the main park area. Installation would occur during a period of lake drawdown. Inasmuch as the land area between the dam and main park area is proposed park natural area, it is particularly undesirable for a sewer easement to be cut through this area. The total length of sewer from the dam to the main park area, along the shore, would be approximately 3800 feet. The sewer line would enter the park at the swimming beach and, from there, follow the park road system to service the various use areas.

Alternative three is based on the prerequisite of public sewer being extended from the eastern town limit along the shore road and terminating at the end of Bella Coola Estates. In order to service the park, the sewer line would follow the alignment of the proposed bicycle trail and tie into the park road system at the family tent and trailer camping area.

Of the three alternatives, number three is most desirable from the aspect of securing a completed sewer system for the entire lake edge in addition to servicing the park. Alternative three would not require the additional 3800 feet of line required in alternative two to connect the dam and main park area. All three alternatives are likely to require the installation of one or more pumping stations as part of the system.

Utility requirements of the park use areas for potable water, electrical, and toilet facilities, according to the completed plan, is as follows.

Visitor Center
Water — 240 persons @ 7.5 gal/person ... 1800 gal/day
toilets — (men) 3 toilets, 2 urinals, 3 lavatories
(women) 4 toilets, 3 lavatories
electrical and telephone required

Ranger Residence(s)
water — 4 persons @ 50 gal/person .... 200 gal/day
toilets, electrical, and telephone required

Maintenance Area
water — .... 1000 gal/day
toilets — 1 toilet, 1 urinal, 1 lavatory

(barracks)
water — 8 persons @ 50 gal/person .... 400 gal/day
toilets — 1 toilet, 1 urinal, 1 lavatory

Group Day Use Area
(reserved group picnic area)
water — 150 persons @ 7.5 gal/day .... 1,125 gal/day
toilet building (men) 2 toilets, 2 urinals, 3 lavatories
(women) 2 toilets, 3 lavatories
electrical required

(unreserved group picnic area)
water — 492 persons @ 7.5 gal/person .... 3,690 gal/day
toilet building — (men) 4 toilets, 3 urinals, 6 lavatories
(women) 7 toilets, 6 lavatories
electrical required to shelter

Family Day Use Area
(family picnicking, fishing area, boat access)
water — 2201 persons @ 7.5 gal/person .. 16,507 gal/day
(3) toilet buildings — (men) 3 toilets, 2 urinals, 4 lavatories
(women) 4 toilets, 4 lavatories

Swimming — Day Use Area
(concession and changing rooms)
water — 2686 persons @ 10 gal/person .. 26,860 gal/day
toilets — (men) 6 toilets, 3 urinals, 8 lavatories, 6 showers
(women) 8 toilets, 8 lavatories, 6 showers
electrical and telephone required

(group picnicking area)
water — 396 persons @ 7.5 gal/person .... 2,970 gal/day
toilet building — (men) 2 toilets, 2 urinals, 3 lavatories
(women) 3 toilets, 2 lavatories
electrical required to shelter

(family picnicking area)
water — 500 persons @ 7.5 gal/person .... 3,750 gal/day
toilet buiding — (men) 3 toilets, 2 urinals, 4 lavatories
(women) 4 toilets, 4 lavatories

Boat Access Area
water — 450 persons @ 7.5 gal/person ..... 3,375 gal/day
toilet building — (men) 4 toilets, 3 urinals, 6 lavatories
(women) 6 toilets, 6 lavatories

Overnight Use Area
(group cabin camps)
water — 100 persons @ 50 gal/person ..... 5,000 gal/day
washhouse — (men) 2 toilets, 1 urinal, 3 lavatories, 2 showers
(women) 3 toilets, 3 lavatories, 2 showers
electrical required

(group tent camps)
water — 150 people @ 5 gal/person .... 750 gal/day
washhouse for 2 camps —
(men) 2 toilets, 1 urinal, 3 lavatories, 2 showers
(women) 2 toilets, 3 lavatories, 2 showers
electrical required
2 pit privies for 1 camp

(family tent & trailer camp)
water — 104 sites @ 150 gal/site .... 15,600 gal
(3) washhouses — (men) 3 toilets, 2 urinals, 4 lavatories, 2 showers
(women) 4 toilets, 4 lavatories, 2 showers
electrical required

(family primitive camp)
water — 72 persons @ 5 gal/person .... 360 gal/day
2 pit privies

Park Natural Area
(interpretive workshop)
water — 600 persons @ 7.5 gal/person .... 4,500 gal/day
toilets — (men) 1 toilet, 1 urinal, 2 lavatories
(women) 2 toilets, 2 lavatories
electrical required

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